UPPER LITTLE BLACKFOOT RIVER RESTORATION PROJECT

An Upper Clark Fork River Basin Restoration Grant Proposal

Submitted to:

STATE OF MONTANA
NATURAL RESOURCES DAMAGE PROGRAM
1301 EAST LOCKEY AVENUE
P.O. BOX 201425
Helena, MT 59620-1425

Submitted by:

DEER LODGE VALLEY CONSERVATION DISTRICT
1 Hollenback Road
Deer Lodge, MT 59722

March 2, 2006

PBS&J

LAND & WATER

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Step 1. Applicant Information and Project Summary Form

1. **Name of Applicant(s):** Deer Lodge Valley Conservation District

2. **Project Title:** Upper Little Blackfoot River Restoration Project

3. **Type of Entity:** County Conservation District

4. **Description of Project Location (Attach map showing location.):** The Upper Little Blackfoot River Restoration Project encompasses approximately 2.6 miles of the Little Blackfoot River beginning at the confluence of Telegraph Creek and continuing downstream to the U.S. Highway 12 crossing one-half mile east of Elliston, MT. The Little Blackfoot River joins the Clark Fork River near Garrison, MT approximately 27 stream miles downstream of the proposed restoration project area. The project location is shown on the map in **Figure 1**. Photos of the project area are included in **Appendix A** of this application.

5. **Injured Natural Resource(s) and/or Impaired Services to be Restored, Rehabilitated, Replaced or Equivalent Acquired through Project:** The Upper Little Blackfoot River Riparian Restoration Project will "replace" injured resources in the Clark Fork Basin. The project will restore and enhance fish and aquatic life, riparian, wildlife and water quality resources in the upper Little Blackfoot River through stream restoration measures, fish habitat enhancement, riparian revegetation, and improved livestock management. The project will "replace" injured fisheries and wildlife resources in the Clark Fork drainage through enhancement of upper Little Blackfoot River fish populations and through increased recruitment of fish to downstream portions of the Little Blackfoot River. The project may also "replace" injured populations of native fish species by increasing available habitat for westslope cutthroat trout and bull trout, both of which are present in limited numbers in the upper Little Blackfoot River.

6. Authorized Representative: Jeff Janke, Chair
(Name) (Title)
Mailing Address: 1 Hollenback Road
(Street/PO Box)
Deer Lodge, MT 59722 (406) 846-1703 x300
(City/State/Zip) (Telephone)

Contact Person*: Susie Johnson Administrator
(Name) (Title)
Mailing Address*: 1 Hollenback Road
(Street/PO Box)
Deer Lodge, MT 59722 (406) 846-1703 x300
(City/State/Zip) (Telephone)
E-mail Address: susie.johnson@mt.usda.gov

7. Proposed Funding Sources

On the table below, enter the source and amount of all funding that may be used for this project. Indicate all potential sources of funds that you intend to apply for this project, even if you have not yet applied for the funds or have not yet received a commitment from the source. Indicate whether matching funds are cash or in-kind.

Funding Source	Amount				
	Grant ($)	Loan ($)	Other Funds ($) (indicate cash or in-kind)	Total ($)	Committed source?
A. UCFRB Restoration Fund	$238,878.80			$238,878.80	
B. NRCS EQIP Program Grant	$43,464.26			$43,464.26	No
C. MFWP Future Fisheries Grant	$20,000.00			$20,000.00	No
D. Montana Noxious Weed Trust Fund	$1.000.00			$1.000.00	No
E. Landowner			$10,400.00[1]	$10,400.00	No

[1] In-kind contribution (materials)

8. Estimated Total Project Cost: $ 313,743 (5-year budget)

9. Private (non-Governmental) Grant Applicant Financial Information

a. Are there any lawsuits, judgments, or obligations pending for or against you? __No__
b. Have you ever declared bankruptcy? __No__
c. Are any of your tax returns delinquent or under dispute? __No__
d. Any unpaid deficiencies? __No__
e. Are you a party to a lawsuit? __No__
f. Do you have any other contingent liabilities? __No__
g. Do your current and deferred liabilities exceed the value of your assets? __No__

Explain all YES answers in a statement attached to this form.

10. Certification for Individuals or Private Entities

Individuals or private entities requesting grant funds must sign the following certification.

Certification for Individuals or Private Entities

I (We) the undersigned, have provided this financial information as part of my (our) application for a grant from the UCFRB Restoration Fund. I (We) certify that the statement is complete and accurate to the best of my (our) knowledge and I (we) authorize the State of Montana to investigate my credit worthiness and any of the matters described above.

Individual(s)

Name	Social Security No.	Signature	Date
Name	Social Security No.	Signature	Date

Social Security Numbers will be kept confidential.

Private Entities

Name of Authorizing Agent	Federal Tax ID No.	Signature	Date

11. Authorizing Statement

An authorized agent/agents representing the applicant must by his/her signature indicate that the application for funds and expenditure of matching funds, as represented, is officially authorized.

Grant Authorization

I hereby declare that the information included in and all attachments to this application are true, complete, and accurate to the best of my knowledge, and that the proposed project complies with all applicable state, local, and federal laws and regulations.

I further declare that, for Deer Lodge Valley Conservation District, I am legally authorized to enter into a binding contract with the State of Montana to obtain funding if this application is approved. I understand that the Governor must authorize funding for this project.

Deer Lodge Valley Conservation District	March 3, 2006
Project Sponsor	Date
_____	Chairperson, Board of Supervisors
Authorized Representative (signature)	Title

Map goes here

Step 2. Proposal Abstract

Applicant Name: Deer Lodge Valley Conservation District

Project Title: Upper Little Blackfoot River Restoration Project

Project Description and Benefits to Restoration:

This project will restore fish habitat, stream channel integrity, and riparian health in a 2.6 mile section of the Little Blackfoot River from Telegraph Creek to the Highway 12 crossing near Elliston. The project area is in need of restoration due to degraded fish habitat, unstable channel geometry, eroding stream banks, degraded riparian vegetation, and infestations of noxious weeds stemming from a combination of the effects of historical floods, past stream channel and stream bank alterations, and livestock over-utilization. An assessment performed on 32 miles of the Little Blackfoot River from the Helena National Forest boundary to the Clark Fork River in 2001 by the Deer Lodge Valley Conservation District ranked this reach of the river as the second highest priority for restoration based on severity of problems, restoration feasibility, and potential for recovery. The highest priority segment of the river will be addressed under a separate restoration project.

In 2005, the Deer Lodge Valley Conservation District completed a stream restoration project plan and an integrated weed management plan for the project area, with partial funding from an Upper Clark Fork Basin Restoration Program project development grant. This project proposal would implement the restoration plan over a five-year period and document its effectiveness in addressing the previously described resource issues. Restoration measures that would be implemented under this project include the following tasks: 1) pre- and post-restoration weed controls, 2) installation of more than 7,000 feet of riparian fencing to allow control of livestock access within the project area, 3) installation of approximately 50 fish habitat improvement structures, 4) stabilization of approximately 2,300 feet of eroding stream banks, 5) adjustments to channel geometry in localized areas, 6) extensive replanting of riparian vegetation, 7) project effectiveness monitoring and documentation, and 8) post-implementation public tours of the project area to demonstrate project effectiveness and restoration methods.

The Upper Little Blackfoot River Restoration Project will "replace" injured resources in the upper Clark Fork Basin through the creation and enhancement of fish, wildlife, and water quality resources equivalent to those that were injured. The project will include the implementation of natural fish habitat improvements structures, channel stabilization, erosion control measures, riparian revegetation, and livestock access controls.

The project will also "replace" injured populations of native and other salmonid fish species. The Little Blackfoot River from its headwaters to its mouth has been identified as a "core area" for native bull trout (*Salvelinus confluentus*), while westslope cutthroat trout (*Oncorhynchus clarki lewisi*) are present throughout the entire Little Blackfoot watershed but in limited numbers. This project will improve habitat for all life stages of westslope cutthroat, bull trout, and other salmonid species in the upper Little Blackfoot River, enhance fish passage to upstream and downstream reaches of the river, increase production of fish food organisms, stabilize stream

banks, restore riparian vegetation and riparian wildlife habitat, decrease sediment loading and in-stream sedimentation, improve water quality, and decrease water temperatures.

Increased recreational opportunities associated with sport fishing will also be realized as a result of this project. The project has the potential to enhance fisheries, water quality, fishing, and recreation for a considerable distance downstream of the project area. The proposed project will also complement the planned restoration of a 2.5-mile section of the lower Little Blackfoot River. Benefits accruing from this project will be maintained over the long term through improved grazing management, ongoing weed control, and continuing monitoring.

The project has an estimated five-year cost of $313,743, of which 24 percent would be derived from matching cash grant or in-kind funding sources. The project would commence with pre-implementation weed controls and riparian fencing in 2007, followed by actual construction during the field season in 2008. Post-project weed controls, livestock management planning, and effectiveness monitoring would continue until at least 2011. Public demonstration tours of the project area would be conducted in 2010.

Anticipated project partners include the Natural Resources Conservation Service, Montana Fish, Wildlife and Parks, Little Blackfoot Watershed Group, the Tri-State Water Quality Council, the Upper Clark Fork River Basin Steering Committee, and the landowner.

Step 3. Technical Narrative

Applicant Name: Deer Lodge Valley Conservation District

Project Title: Upper Little Blackfoot River Restoration Project

A. Describe Project/Define Problem

The Little Blackfoot River's fish populations, aquatic habitat, and water quality are far below their potential due to man's impacts. A 2001 assessment of 32 miles of the Little Blackfoot River from the Helena National Forest boundary to Garrison, MT sponsored by the Deer Lodge Valley Conservation District found that conditions along the river corridor had improved overall since a 1979 study but that significant problems remained. Riparian and aquatic habitat conditions were well below potential throughout most of the river. The major cause of impairment was a lack of deep-rooted stream bank vegetation, which had accelerated lateral erosion of the river channel. The major source of impairment was historical stream channel alterations that reduced channel length, restricted the floodplain, increased the river gradient, and contributed to channel incisement. A secondary source of impairment was localized land management practices and stream bank alterations. The study concluded that many of the problem reaches could be cost effectively improved.

The Little Blackfoot assessment report ranked the reach of the river from Telegraph Creek to the U.S. Highway 12 crossing as one of the two highest priorities for restoration priority based on the severity of problems, restoration feasibility, and potential for recovery. Limiting factors in this segment of the river included damage from historical flood events, upstream and on-site

channel and bank alterations, localized land use practices that have caused a decline in condition of streamside vegetation and channel integrity, and lateral migration of the stream channel in the project area into proximity with valley terraces. The assessment showed that up to 50 percent of the stream banks lacked woody, deep-rooted vegetation, while 30 percent of all stream banks showed excessive erosion and instability problems. A high frequency of sediment source areas was responsible for in-stream deposits of fine sediments in both pool and riffle habitat types. Channel widths and width-to-depth ratios were excessive, which contributed to a severe anchor ice problem in winter and a seasonal limitation to the fishery. Quality of fish habitat declined from upstream to downstream in this reach, as a result of declining riparian vegetation, pool frequency, woody debris, shade and cover, and increasing in-stream sediment deposits. Water quality and stream channel and riparian integrity also declined in a downstream direction throughout the 2.6-mile project area. Nuisance levels of filamentous green algae were periodically seen in the Little Blackfoot River in the project area suggesting nutrient enrichment from livestock wastes. Noxious weeds were abundant throughout the project area, which negatively influenced the health of the riparian area. A major factor in the high prioritization of this reach was the opportunity to reverse an apparent trend of declining condition before the problems became critical and the remedies more expensive.

In 2005, a detailed restoration plan was completed for this segment of the river. The proposed restoration plan includes weed control, riparian fencing, installation of fish habitat improvement structures, stabilization of eroding stream banks, localized adjustments to stream channel geometry, riparian revegetation, project effectiveness monitoring, and public tours of the project area to demonstrate project methods and public benefits. Implementation of the plan will benefit the river's fish populations, enhance the available habitat for bull trout and westslope cutthroat, improve water quality, and restore hydrologic and riparian integrity and functionality to 2.6 miles of the Little Blackfoot River. The project will reverse a declining trend in conditions and correct the previously described problems before remedies become potentially much more expensive. Future conditions and benefits that will accrue from this project are described in more detail in the following sections.

B. Describe the Project Goals and Objectives

Current Conditions

Two segments of the Little Blackfoot River, from its headwaters to Dog Creek (21.6 miles), and from Dog Creek to the Clark Fork River (26.2 miles), are significantly impaired in their ability to support state-designated water uses for trout fisheries, associated aquatic life, drinking water, and recreational uses due to riparian degradation, habitat alterations, sediment, nutrients, and metals pollution, flow alterations, and dewatering (MDEQ 2005).

Fisheries resources of the Little Blackfoot River do not live up to their potential due to habitat degradation, stream dewatering, and water quality problems. Native species, including bull trout (*Salvelinus confluentus*) and westslope cutthroat (*Oncorhynchus clarki lewisi*), are present in the watershed but are imperiled due to habitat fragmentation and degradation, competition with non-native species and water quality issues, especially water temperature problems. The Little

Blackfoot River from its headwaters to its mouth has been identified as a "core area" for native bull trout. Bull trout are native to the Little Blackfoot River and its tributaries and, as part of the Columbia River Basin population, were listed as threatened under the Endangered Species Act in July 1998. The bull trout also appears on the State of Montana's Animal Species of Special Concern list with a state rank of S2. An S2 rank is described as "imperiled because of rarity or because of other factors demonstrably making it very vulnerable to extinction throughout its range" (Carlson 2001). Westslope cutthroat trout are present in the entire Little Blackfoot watershed in limited numbers. Westslope cutthroat trout is also included on the State of Montana's list of Animal Species of Special Concern with a state rank of S2. Westslope cutthroat are also listed as "sensitive" by the USFS and are given "special status" by the BLM, the latter defined as a "federally-listed endangered, threatened, or candidate species or other rare or endemic species that occur on BLM lands".

The Deer Lodge Valley Conservation District and watershed stakeholders represented within the Little Blackfoot Watershed Group have taken a lead role since 2001 in assessing the river and in developing a phased plan for addressing its many resource issues. Past studies and planning efforts are summarized in the following section.

Background Studies

Pre-2000 Studies

Considerable past effort has been expended in evaluating and describing the aquatic resources of the Little Blackfoot watershed, and in defining problems and their causes in order to support improved management. As early as 1959, the Powell County Water Resources Survey conducted by the Montana State Engineers Office described the Little Blackfoot drainage's resources and management challenges. The condition of the county's watersheds were described as "only fair", and problems and threats accruing from past and present mining operations, livestock and wildlife overgrazing, construction and maintenance of dams and reservoirs, logging activities, road construction, forest fires and insects were discussed (State of Montana 1959).

In 1979, the Natural Resources Conservation Service (NRCS) performed a physical features inventory of the Little Blackfoot from Elliston to Garrison. The purpose of the study was to establish baseline resource data to assist the Deer Lodge Valley Conservation District in making management recommendations to landowners along the river. The assessment report expressed concerns over the effects of logging in the upper watershed on basin hydrology and timing of runoff, and described the extensive stream channel alterations below Elliston and their influence on channel stability. The inventory provided a detailed appraisal of the river corridor's natural and physical attributes and provided general recommendations for solving the many man-caused or aggravated erosion problems that were encountered (USDA 1981).

Beginning in 1988, and following the devastating flood of 1981, a floodplain management study was conducted jointly by the Natural Resources Conservation Service, Powell County, the Deer Lodge Valley Conservation District, and the Montana Department of Natural Resources and Conservation. The study report described past flooding problems and their causes, evaluated

future flood potential, delineated flood hazard areas and examined control alternatives (USDA 1991).

Resolution of water supply and in-stream flow problems in the Little Blackfoot drainage has been the focus of several past and ongoing efforts. In 1989, Montana Fish, Wildlife and Parks filed a water reservation application for in-stream flow protection in the upper Clark Fork River and its tributaries, including the Little Blackfoot River. Irrigation interests challenged the action and a contested case water reservation hearing was scheduled. Before proceeding to hearing, the reservation applicants and objectors began negotiating a settlement. Ultimately, they asked the 1991 legislature to temporarily close the upper Clark Fork River Basin to new water use permits in order to maintain the status quo while allowing time for further negotiations. The legislature responded by closing the basin, formally creating the Upper Clark Fork River Basin Steering Committee, and requiring the committee to develop a basin water management plan for presentation to the governor and 1995 legislature. The intent of the plan was to create mechanisms for balancing all beneficial water uses in the upper basin, including fish and aquatic life, recreation, municipal water supply, irrigation, industrial uses, hydropower generation, in-stream flow and other uses.

The Upper Clark Fork River Basin Steering Committee completed its water management plan late in 1994. The major elements of the plan included: 1) a permanent moratorium on new water use permits in the basin, with exceptions, 2) protection of existing water rights, 3) an in-stream water leasing pilot study, 4) recommendations pertaining to structural and non-structural water storage mechanisms, 5) a continuing water management planning mechanism, and 6) recommendations for improving water quality through wastewater re-use and non-point source pollution control measures. The Upper Clark Fork Water Management Plan primarily established broad water use policy and created an ongoing water management planning mechanism. It has also been effective at ensuring that current water supply problems do not get worse. However, the plan does not establish specific mechanisms for identifying, evaluating and resolving localized water quality or water supply problems, other than providing a forum for discussions among the affected parties (Upper Clark Fork River Basin Steering Committee 1994).

A number of water quality and fisheries investigations have been performed in the Little Blackfoot watershed. Extensive data covering a time period from 1977-1998 are available for the 21.6-mile reach of the Little Blackfoot River from the headwaters area to Dog Creek. These include fisheries data collected by Montana Fish, Wildlife and Parks (MFWP) and the U.S. Forest Service (USFS), non-point source stream reach assessments sponsored by the Montana Department of Environmental Quality (DEQ), water sample analyses by the USFS and DEQ, stream bottom sediment metals analyses by MFWP, state-sponsored abandoned mine surveys, inter-agency fish habitat assessment information, and others. Montana DEQ has organized all of these data and resulting assessment information within a computerized database designed to support watershed restoration activities under its TMDL (total maximum daily load) program.

Fairly extensive data are available as well for the Little Blackfoot River from Dog Creek to the mouth, a reach of 26.2 stream miles. DEQ contractors surveyed four reaches within this segment in 1991 using the non-point source stream reach assessment approach. MFWP conducted

sediment metals analyses at four sites in 1998. MFWP and inter-agency data for fish species and abundance are available for 1977-1996. MFWP conducted fish tissue metals analyses in 1982 and the USGS performed water, bed sediment and biological sampling in 1998. Numerous individual water chemistry data are available for the Little Blackfoot drainage within the U.S. EPA's STORET data storage and retrieval system. A University of Montana researcher analyzed fish tissue samples from several areas of the upper Clark Fork Basin in the early 1970s, including the Little Blackfoot River (VanMeter 1974).

Based on these data and studies, DEQ has listed the reach of river from the headwaters to Dog Creek as "partially supporting" aquatic life and cold water fisheries, and "fully supporting" its other designated uses. The probable causes of impairment in the upper river are metals, siltation, riparian degradation, and other habitat alterations. The Little Blackfoot River from Dog Creek to its mouth is listed as "partially supporting" aquatic life, cold water fisheries, drinking water, and primary contact recreation (swimming), and "fully-supporting" agricultural and industrial water uses. Suspected causes for water quality problems in the lower river are metals, nutrients, siltation, dewatering, riparian degradation, flow alterations, and other habitat alterations (MDEQ 2005).

Montana Fish, Wildlife and Parks listed the Little Blackfoot River from Elliston Creek to the Clark Fork River as a chronic stream-dewatering area of concern. This designation applies to "streams that support important or contribute to important fisheries that are significantly dewatered by man-caused flow depletions", and where "dewatering is a significant problem in virtually all years". Montana Fish, Wildlife and Parks set an in-stream flow target of 85 cfs for the Little Blackfoot River from Dog Creek to the mouth, and a target of 17 cfs from the headwaters to Dog Creek (MFWP 2002).

2001 Physical Features Inventory and Riparian Assessment

The Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group completed this study in 2001, with funding from the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation, and the Montana Power Company. The purpose of this project was to establish a scientific foundation and clear sense of direction for improving water quality and aquatic habitat in the Little Blackfoot River. The project focused on the main stem of the river from the Helena National Forest boundary downstream to the river's confluence with the Clark Fork of the Columbia River near Garrison, Montana. This section of the river had sustained impacts from past flood events, and from extensive manipulation of the river channel for flood control purposes and due to railroad and highway construction and other land use activities. These impacts were generally well known and had been the subject of several past studies. However, a systematic and comprehensive evaluation of main stem problems, sources and solutions was lacking.

The Little Blackfoot Watershed Group established three objectives for the project: 1) provide relevant information to watershed residents for the purposes of improving water quality in the Little Blackfoot drainage, 2) conduct an inventory of the Little Blackfoot River channel to establish baseline conditions and time trends, evaluate problems and their causes, and set priorities for restoration, and 3) develop a phased water quality improvement plan that provides

solutions to documented problems and attains desired water quality and aquatic habitat improvement goals. The 2001 river-wide assessment included several modules, as follows:

Stream Reach Surveys

The river study area was divided into 12 sections for purposes of conducting the various assessments. Each reach was walked in its entirety and general features and problem areas were recorded in narrative fashion, photographed and keyed to map locations. The 12 river reaches were later divided into 28 sub-reaches for purposes of data interpretation and discussion. Features noted as part of the reach surveys included: adjacent land use, land ownership, general landforms, stream flow stage, stream bottom composition, stream channel and bank stability, riparian vegetative condition, presence of channel modifiers (such as bridges, culverts, debris jams, riprap, beaver dams, etc.), observations of fish and aquatic plants, water quality indicators (e.g. turbidity, odor, temperature, etc.), and application of best management practices.

Physical Features Inventory

Present condition of the river channel, as well as changes over time, was evaluated using the Natural Resources Conservation Service Physical Features Inventory procedure and by comparing 2001 survey results to those from a similar 1979 survey (USDA 1981). The inventory was conducted by walking each of 10 designated stream reaches below HW12 near Elliston. Field observations were recorded on indexed, large-scale aerial photographs of the river corridor. Inventory features were marked on the maps and tallied on field sheets. Measurements for the selected parameters were determined directly from the aerial photographs and compiled by designated stream reach for analysis. Data from each reach, and for the entire study area, were tabulated and graphically summarized. Maps were then prepared which summarized some of the more important channel features for each river reach. Inventoried parameters included the following: eroding stream banks, critical sediment sources, stream bank alterations (including blanket rock riprap, rock jetties, car bodies, river gravel dikes, and other alterations), stream channel alterations, irrigation diversions, debris jams, and channel obstructions. The annotated aerial photographs, inventory sheets and study results from the original 1979 inventory were obtained from the Natural Resources Conservation Service office in Deer Lodge and compared to the 2001 results. Channel features were tabulated for both periods and graphically summarized for comparison purposes.

Aquatic Habitat Evaluation

The quality of habitat available for fish and other aquatic life was evaluated by measuring the quality and frequency of pools, distribution and abundance of large woody debris, condition of stream banks and bed material, substrate composition, quality of riffle habitat and spawning gravels, potential barriers to fish movement and migration, areas of apparent upwelling ground water (springs), water temperature, dewatering problems, and other factors.

Riffles and runs are responsible for most of the fish food production (aquatic insects) in streams and rivers. However, the availability of pool habitat for over-wintering and as thermal refuges during hot, dry summer conditions is generally a more critical limiting factor to cold water

fisheries. Large woody debris is a critically important component of fish habitat. The presence of anchored, large woody material in a stream course contributes to energy dissipation, bank and channel stability, pool formation, shading and temperature control, and overall habitat diversity.

Riparian Assessment

Riparian function and sustainability was evaluated for each river reach using the NRCS Riparian Assessment Method (USDA 2000). This method is a modification of the RWRP method in use since 1992 (Thompson et al. 1998). Sustainability is the ability of a stream and its riparian area to trap sediment, dissipate energy, build stream banks, store water, recharge aquifers, and support diverse and productive biological communities. The NRCS riparian assessment method is intended to provide an indexed rating useful for stratifying and prioritizing problem reaches for treatment, or for more detailed study. It can be used to help identify problem thresholds, critical factors and restoration goals. The method evaluates a stream reach on the basis of 11 major riparian criteria, and returns an assessment rating of "Sustainable", "At Risk" or "Not Sustainable".

Stream Channel Morphology

Following completion of the stream reach surveys and physical features inventory, impaired and reference reaches of the Little Blackfoot River were selected for geomorphic surveys and analysis. The objective of this effort was to evaluate the morphologic responses of the river to various inputs, and to help discern causes of identified channel instability problems.

Fluvial systems are constantly striving to maintain a dynamic equilibrium by compensating for various inputs. Rivers attempt to maintain this equilibrium state with regard to sediment supply, runoff quantities and energy dissipation. This maintenance occurs by adjustments in a stream's channel dimensions, including width, depth, and slope. Channel geometry and morphology are key factors in evaluating the state of a river and its stability and overall health. Morphological variables can aid in detecting impairment problems, and in establishing priorities and design criteria for stream restoration efforts.

The 1995 and 1979 aerial photographs of the river referenced earlier were used as a starting point for the geomorphic investigation. The photo sets were geographically indexed and the1979 river channel was then superimposed onto the 1995 photos to graphically illustrate channel movements that had occurred during the 16-year interim period. 1979 channel lengths for the 2001 study reaches were measured from the early photographs with a digitizing area-line meter and the data were graphed. The photo pairs and measurement data were examined for increases or decreases in channel length or sinuosity, as well as other characteristics. The information was then interpreted relative to hydrologic and morphologic trends and potential effects on the river's ability to transfer sediment and dissipate energy.

Cross-sectional surveys were conducted at ten locations within the study area. These survey locations consisted of a combination of reference reaches and impaired reaches. A number of measurements were taken at each location, including: bank-full width, channel depth, entrenchment width and depth, pebble counts, and largest diameter particle size on the

downstream one-third of point bars to establish shear stress. All pebble counts were conducted at riffle locations using a linear stratified sampling method at the location of the cross-sectional measurements. The cross-sectional data were used to calculate shear stresses and to establish Level II Rosgen stream channel classifications for each reach (Rosgen, 1996).

Pollution Source Assessment

Visual screening was conducted during the stream reach surveys and physical features inventory for potential sources of water quality impairment. These included flow alteration, elevated water temperature, siltation, nutrient enrichment, heavy metals, and trash disposal. Locations and severity of these problems were described in narrative fashion and sites photographed.

Results

The 2001 assessment found that conditions along the river corridor had improved overall since a 1979 study but that significant problems remained. Approximately 30,000 feet of eroding stream banks (about 10% of the total), 34,000 feet of stream bank alterations (12%), and 5,000 feet of critical sediment sources (2%) were documented in 2001. Riparian and aquatic habitat conditions were well below potential throughout most of the river. The major cause of impairment was a lack of deep-rooted stream bank vegetation, which had accelerated lateral erosion of the river channel. The major source of impairment came from historical stream channel alterations that reduced channel length, restricted the floodplain, increased the river gradient, and contributed to channel incisement. A secondary source of impairment came from localized land management practices and stream bank alterations. Interspersed throughout the river were a number of high quality reference reaches, which demonstrated the potential to effectively restore this portion of the study area. The study concluded that many of the problem reaches could be cost effectively improved. Current condition of the Little Blackfoot watershed and supporting data are summarized in the Deer Lodge Valley Conservation District's 2001 assessment report (Land & Water Consulting 2002). Detailed maps, photographs, and assessment statistics describing the nature of the problems and the underlying causes are also included in the report.

Little Blackfoot River within the Proposed Restoration Project Area (from Telegraph Creek to U.S. Highway 12/Dog Creek)

Limiting factors within the proposed Upper Little Blackfoot River Restoration Project area included damage from historical flood events, upstream and on-site channel and bank alterations, localized land use practices that have caused a decline in condition of streamside vegetation and channel integrity, and lateral migration of the stream channel in the project area into proximity with valley terraces. The 2001 assessment showed that up to 50 percent of the stream banks lacked woody, deep-rooted vegetation, while 30 percent of all stream banks showed excessive erosion and instability problems. A high frequency of sediment source areas was responsible for in-stream deposits of fine sediments in both pool and riffle habitat types. Channel widths and width-to-depth ratios were excessive, which contributed to a severe anchor ice problem in winter and a seasonal limitation to the fishery. Quality of fish habitat declined from upstream to downstream in this reach, as a result of declining riparian vegetation, pool frequency, woody

debris, shade and cover, and increasing in-stream sediment deposits. Water quality and stream channel and riparian integrity also declined in a downstream direction throughout the 2.6-mile project area. Nuisance levels of filamentous green algae were periodically seen in the Little Blackfoot River in the project area suggesting nutrient enrichment from livestock wastes. Noxious weeds were abundant throughout the project area, which negatively influenced the health of the riparian area.

The riparian assessment produced a score of 61 for the reach of the river between Telegraph and Dog creeks, which classified the reach as "At Risk". Primary factors contributing to the low riparian assessment score included lateral cutting of the stream, stream imbalance, insufficient soil, inadequate root mass, the presence of weeds and other undesirable plants, browse over utilization, degraded riparian vegetative cover, and unhealthy floodplain characteristics (**Table 1**). Interestingly, the two healthiest reaches of the Little Blackfoot River from the standpoint of riparian conditions were located immediately upstream and downstream of the proposed Upper Little Blackfoot River Restoration Project area. These reaches extended from the forest boundary to Telegraph Creek (reach 5), and from Dog Creek to the Elliston Cemetery (reach 7), and produced riparian ratings of 97 and 90 percent, respectively, suggesting nearly optimal channel conditions. The proximity of healthy segments in immediate proximity to the proposed project area demonstrates site potential and provides a reference area for restoration goal setting.

The Little Blackfoot assessment report ranked the proposed restoration project area as one of the two highest priorities for restoration based on the severity of problems, restoration feasibility, and potential for recovery (Land & Water Consulting 2002). A major factor in the high prioritization of this reach was the opportunity to reverse an apparent trend of declining condition before the problems became critical and the remedies more expensive. This information is summarized in **Table 2** below.

Table 1. ***Little Blackfoot River riparian assessment data summary, August 2001 (reproduced from Land & Water 2002).***

ASSESSMENT CRITERION	REACH											
	LBR05	**LBR06**	**LBR07**	**LBR08**	**LBR09**	**LBR10**	**LBR11**	**LBR12**	**LBR13**	**LBR14**	**LBR15**	**LBR16**
Stream Incisement	8	8	6	6	8	8	8	8	8	8	6	8
Lateral Cutting	6	2	4	2	2	4	4	2	2	2	2	0
Stream Balance	6	4	6	6	6	6	6	6	6	6	4	4
Sufficient Soil	3	3	3	3	3	2	3	3	3	3	3	3
Root mass	6	2	6	4	4	2	4	2	2	2	2	2
Weeds	1	0	1	0	0	0	0	0	0	1	0	0
Undesirable Plants	3	2	3	2	2	2	2	2	2	2	2	2
Woody Species Establishment	8	6	8	4	6	6	6	4	6	6	4	6
Browse Utilization	4	2	4	2	4	3	3	3	3	3	2	3
Riparian/Wetland Vegetative Cover	8	4	8	4	6	2	6	2	4	2	2	2
Riparian Area/Floodplain Characteristics	6	4	6	4	6	4	4	4	4	4	4	2
Total Score	59	37	55	37	47	39	46	36	40	39	31	32
Riparian Rating (%) (Actual/Potential Scores X 100)	97	61	90	61	77	64	75	59	66	64	51	52

Table 2. ***Decision-support matrix for prioritizing restoration activities in the Little Blackfoot River (reproduced from Land & Water 2002).***

REACH *	ASSESSMENT RATINGS						RESTORATION FEASIBILITY					TOTAL
	Stream bank Erosion [1]	Stream bank Alterations [1]	Channel Morphology [1]	Aquatic Habitat [1]	Riparian Assessment [1]	Assessment Total	Technical Feasibility [2]	Cost [3]	Benefits VS Cost [2]	Landowner's Willingness [2]	Restoration Total [2]	
5	0	1	1	0	0	2	0	0	0	--	0	2
6	3	1	2	2	2	10	3	3	3	--	9	19
7	1	1	1	2	0	5	1	1	1	--	3	8
8	2	1	3	2	2	10	1	1	2	--	4	14
9	2	2	2	1	2	9	3	3	1	--	7	16
10	1	2	3	2	2	10	3	2	3	--	8	18
11	1	2	2	2	2	9	3	2	3	--	8	17
12	2	3	2	2	2	11	2	2	2	--	6	18
13	2	3	3	2	2	12	2	2	2	--	6	18
14	3	2	2	2	2	11	3	2	3	--	8	19
15	2	2	3	3	3	13	1	1	2	--	4	17
16	3	2	2	3	3	13	3	2	3	--	8	21

*Reaches are consecutive segments of the Little Blackfoot River from the Helena National Forest Boundary to the Clark Fork River.
Reach 6 is the Little Blackfoot River from Telegraph Creek to U.S. Highway 12/Dog Creek (proposed project area).
[1] Assessment Ratings: 3 = major problem; 2 = moderate problem; 1 = minor problem; 0 = insignificant problem
[2] Restoration Feasibility: 3 = high; 2 = moderate; 1 = low; 0 = unknown or not applicable
[3] Cost: 3 = low; 2 = moderate; 1 = high

2005 Upper Little Blackfoot River Restoration Project Plan

The Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group applied for an Upper Clark Fork Basin Restoration Program project development grant in 2004 for purposes of developing detailed plans and design specifications for the Upper Little Blackfoot River Restoration Project. The project was intended to represent an initial phase of a longer term restoration plan for the entire river, as well as a demonstration of restoration methods that could be applied elsewhere in the Little Blackfoot corridor (DLVCD 2003).

The restoration planning that was conducted under this project development grant involved additional field data collection, channel surveys, historical photograph analysis, computer modeling and hydrologic analysis, coordination with property landowners, and development of detailed design plans and specifications. The Upper Little Blackfoot River Restoration Project plan was completed in 2005 and will serve as the primary template for this proposed project (Land & Water/PBS&J 2005). Elements of the restoration plan include a series of bio-engineering techniques and riparian planting to stabilize stream banks, increase the available pool and riffle habitat for fish, and decrease sources of sedimentation. The Upper Little Blackfoot River Restoration Project report also identified the need to control noxious weeds and emphasized that weed control was integral to the success of restoring the stream. The restoration plan is described in more detail in the Project Goals and Objectives and Project Implementation Plan sections of this application. The entire restoration plan is available through the Natural Resources Damage Program.

2005 Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project

In early 2005, the Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group applied for a Local Empowerment Program (LEP) through the Montana Association of Conservation Districts for purposes of developing an integrated weed management plan for the Upper Little Blackfoot River Restoration Project area. The project area encompasses approximately 2.6 miles of river corridor and more than 180 acres of land.

An integrated weed management plan (IWMP) will be key to the success of implementing the Upper Little Blackfoot River Restoration Project because: a) noxious weeds lack the root structure necessary to reduce erosion and maintain stream banks during high energy stream flows, b) noxious weeds are either toxic or provide poor nutritional forage for livestock, deer, and elk, c) ground disturbance created through the process of restoring streams can increase noxious weed populations, and d) state laws specify that it is unlawful for any person to permit any noxious weed to propagate or produce seeds on their land unless the landowner adheres to the noxious weed management program of their county, or has entered into and is in compliance with a written noxious weed management plan for their property (Montana County Noxious Weed Control Law 7-2101-2153).

The long-term goal of the IWMP for the Upper Little Blackfoot River Restoration Project is to create a riparian corridor that is resistant to noxious weeds. A five-year goal is to implement stream restoration while simultaneously decreasing the density and distribution of spotted

knapweed (*Centaurea maculosa*), hound's-tongue (*Cynoglossum officinale*), Canada thistle (*Cirsium arvense*), yellow toadflax (*Linaria vulgaris*), and ox-eye daisy (*Chrysanthemum leucanthemum*). Implementation of the IWMP is expected to greatly reduce noxious weeds in the project area because it will: a) use a variety of control methods in the appropriate microhabitats to kill noxious weeds, b) plant native vegetation to complete against noxious weeds, c) alter existing microhabitats such that native riparian vegetation can successfully grow and reproduce, d) help the landowner to implement stream management techniques that will encourage healthy riparian vegetation and discourage noxious weed establishment, and e) help the landowner to coordinate weed control in the uplands with that in the riparian corridor.

Desired Future Condition

The proposed restoration plan includes weed control, riparian fencing, installation of fish habitat improvement structures, stabilization of eroding stream banks, localized adjustments to stream channel geometry, riparian revegetation, project effectiveness monitoring, and public tours of the project area to demonstrate project methods and public benefits. Implementation of the proposed restoration project will increase the available habitat for resident and migratory fish, including bull trout and westslope cutthroat. The project will also enhance trout recruitment to upstream and downstream reaches of the Little Blackfoot River, and increase public recreational opportunities through improved fishing and aesthetics. The Little Blackfoot River is classified as an "outstanding fisheries resource" by the Montana Department of Fish, Wildlife and Parks and supports more than 7,000 angler use-days each year. Benefits to the local economy associated resident and non-resident fishing will be increased as a result of this project.

The project will restore hydrologic and riparian integrity and functionality and improve water quality in 2.6 miles of the Little Blackfoot River, and reverse a declining trend in conditions before remedies become potentially much more expensive. Weed densities will be reduced within and beyond the project area through implementation of an integrated weed management plan. A grazing management plan will be developed and implemented in cooperation with the Natural Resources Conservation Service and the landowners in order to maintain project improvements over the long-term. The project will also contribute to enhanced riparian and stream channel integrity throughout a larger reach of the Little Blackfoot River totaling 6.9 miles, because conditions are generally healthy in sections immediately upstream (2.4 miles) and downstream (1.9 miles) of the project area.

Project Goals and Objectives

No previous attempts had been made to look at the problems in the Little Blackfoot watershed from a comprehensive watershed perspective. The Upper Little Blackfoot River Restoration Project is intended to address the above-described problems in a 2.6 mile reach of the Little Blackfoot River. It represents an initial step in a multi-phased restoration plan for the entire river, as well as a demonstration of methods for restoring channel integrity, stream bank stability, and fish and riparian habitat that can be applied elsewhere in the Little Blackfoot corridor. The restoration plan is described in detail in the Upper Little Blackfoot River Restoration Design Project report (Land & Water/PBS&J 2005).

The primary goals of the Upper Little Blackfoot River Restoration Project are to improve habitat for and increase production of fish and associated aquatic life, improve stream channel geometry, stabilize and revegetate stream banks, restore riparian vegetation and riparian wildlife habitat, reduce sediment inputs and in-stream sedimentation, and improve water quality. Secondary goals are to maintain the improvements to the river through improved management of grazing and other land uses, to enhance recreational opportunities in the Little Blackfoot River, to improve water quality in downstream portions of the watershed, and to encourage other similar restoration projects by demonstrating methods and benefits to area landowners and watershed stakeholders. The proposed project will also complement the planned restoration of a 2.5-mile section of the lower Little Blackfoot River (Land & Water 2004).

There are six specific objectives aimed at reversing the instability trend and restoring the project reach to a healthy, functioning river corridor, as follows:

1. Adjust channel geometry. Localized adjustments in channel geometry are recommended in order to better mimic natural reference cross-sections and to attain and maintain natural stream patterns, dimensions and profiles. Locations requiring adjustments are generally associated with areas of excessive bank erosion and geometry adjustment will be incorporated into bank stabilization techniques. This includes adjusting the channel cross-sectional area and reducing the width/depth ratio of the river. River sections with overly wide/shallow channel will be narrowed and deepened. Increasing channel length and sinuosity was also considered but was rejected based on detailed hydraulic and hydrologic analysis.

2. Stabilize actively eroding banks. Channel stabilization measures are required in order to curb erosion and allow revegetation to be successful. Accelerated bank erosion will continue unless some form of bank stabilization is applied at selected sites. Erosion is generally associated with lack of bank side riparian vegetation and sediment deposition associated with bank erosion immediately upstream. The selected bank treatment options will increase resistance to shear stress and erosion during the short term until riparian vegetation can become established to the degree that is able to provide natural control of bank erosion. In the long term, these banks will be allowed to migrate but at a much slower rate, thus allowing the riparian vegetation to become established on the point bars while maintaining a functional width/depth ratio. At least 50 bank stabilization/fish habitat structures are planned in addition to reconstructing 515 feet of stream banks with high erosion potential.

3. Enhance fish habitat. Structural improvements and overhead cover are needed within the project area to create and enhance available fish habitat. The diversity of fish habitat types is low within the project area and habitat features such as pools, undercut banks, overhanging vegetation, root wads, woody debris jams, and rock clusters are limited. Fish habitat components will be incorporated into the design techniques for stabilizing banks and adjusting the channel geometry. As mentioned above, at least 50 bank stabilization/fish habitat structures are planned. Two large woody debris jams will also be created to emulate similar habitat features elsewhere in the project reach.

4. Restore and protect riparian vegetation. The long-term health and functionality of the river will be dependent on the establishment of a healthy riparian vegetative community. This community will need to be mature enough to control meander migration rates and wide/healthy enough to dissipate flood flow energy. All reconstructed and disturbed areas within the project area will need to be revegetated with native transplants and sprigs, reseeded with native seed, and treated for noxious weeds. An estimated minimum of 120 mature willow plants and 5,000 dogwood, willow, and cottonwood sprigs will be planted in the project area. Species will be selected that are native to and commonly found in the Little Blackfoot drainage. Implementation of the previously described integrated weed management plan, including pre- and post-restoration weed controls, is included within this objective.

5. Maintain project improvements and monitor their effectiveness. Long-term success of the project will be contingent on project staff working with the landowners following project construction to protect and enhance the riparian corridor through the restored project reach. This protection will need to include riparian fencing and development of a grazing management plan. The riparian corridor in most of the project area will be excluded from grazing for at least 5 years after the project construction has been completed to allow riparian vegetation to mature and the stream banks to stabilize. A "before-and-after" monitoring plan will be implemented to evaluate changes in aquatic habitat, stream channel, riparian, fisheries, water quality and land use variables over time in order to gage project success, evaluate grazing management relative to riparian restoration goals, and to make appropriate adjustments.

6. Public education. Significant value can be added to this project by sharing restoration methods and demonstrating overall benefits with area landowners, watershed stakeholders, and the interested public. Following full implementation of the on-the-ground improvements, one or more public tours will be arranged for the Deer Lodge Valley Conservation District, the Little Blackfoot Watershed Group, area landowners, the Upper Clark Fork River Basin Remediation and Restoration Education Advisory Council, and the media. The purpose of the tour(s) will be to demonstrate innovative and cost-effective restoration measures, to explain project benefits, and to encourage landowner interest in pursuing additional restoration projects within the Little Blackfoot watershed.

C. Project Implementation Plan

The Deer Lodge Valley Conservation District will be responsible for procuring and administering grant funding, documenting project expenses, contracting for construction and fencing crews, and providing overall coordination for the Upper Little Blackfoot Restoration Project.

Consultants awarded contracts for various elements of the stream restoration project will be responsible for the preparation of final construction documents, securing all required permits, construction activities, and construction oversight. Fencing contractors will be hired either by

the landowner or the Deer Lodge Valley Conservation District depending on requirements of funding sources. The consultant will be the liaison between the landowner and the Deer Lodge Valley Conservation District as well as between funding sources and project implementation elements. The consultant will also coordinate volunteer efforts. The landowner has been, and will continue to be, involved in approving construction plans and planning the activities of the project. Sequential project implementation tasks and their rationale are summarized below.

Task 1 - Project Administration

The Upper Little Blackfoot River Restoration Project design document completed in 2005 will serve as the primary guide for implementing this project. Upon approval of project funding, the Deer Lodge Valley Conservation District will hire a qualified contractor to finalize remaining details of the construction plans and specifications. Tentative matching funding identified in this application will be secured and contracts finalized. At that time, applications will be submitted for the following permits:

MPDES General Stormwater Permit, Construction Related

This permit may be required to address stormwater treatment and discharge during construction. The primary issue is sediment control through run-off prevention, reduction of erosion and treatment of stormwater prior to release from the project site. A series of Best Management Practices (BMPs) will be employed in a Pollution Prevention Plan to satisfy the permit requirements.

Montana Natural Streambed and Land Preservation Act (310 permit)

This permit applies to all nongovernmental work in or near a stream and is administered by the county Conservation District. Stream bank stabilization measures and fish habitat installation associated with this project will require this permit.

Short-Term Exemption From Montana's Surface Water Quality Standards

This permit is administered by the Montana Department of Environmental Quality and is applicable for any activity initiating a short-term violation of state surface water quality standards. The major application of this law relates to sediments and turbidity usually caused by construction activities. This permit will be required for stream bank and stream channel restoration activities that may temporarily affect in-stream water quality.

Federal Clean Water Act Section 401 Certification

This certification is administered by the Montana Department of Environmental Quality and allows the state to review and approve, condition, or deny all federal permits or licenses that might result in a discharge to state waters, including wetlands. The major federal licenses and permits subject to Section 401 are Section 402 and 404 permits (in non-delegated states), Federal Energy Regulatory Commission hydropower licenses, and Rivers and Harbors Act Section 9 and 10 permits. States and tribes may choose to waive their Section 401 certification authority.

Montana Floodplain and Floodway Management Act (Floodplain Development Permit)

This permit is administered by the Montana Department of Natural Resources and Conservation and, in some counties, by a local floodplain coordinator. The permit is applicable to new construction within a designated 100-year floodplain. Construction within the floodplain is limited to certain activities and the successful permit application must demonstrate that the construction does not raise the base flood water surface elevation by more than 0.5 feet (less in some counties).

Federal Clean Water Act (404 permit)

This permit is administered by the U.S. Army Corps of Engineers (COE) and is applicable to any activity that will result in the excavation, discharge, or placement of dredged or fill material into waters of the United States, including wetlands. This permit will require delineation of any wetlands potentially disturbed by the proposed project and determination if a nation-wide or individual 404 permit is required. If more than 0.1acres of wetland will be filled, wetland mitigation will be required after negotiation of replacement ratios with the COE.

A condition of the 404 permit will require compliance with Section 7 of the federal Endangered Species Act, and confirmation that the project will not adversely affect proposed or listed threatened or endangered species. As previously discussed, the project occurs within documented core bull trout habitat. Consequently, consultation with the U.S. Fish & Wildlife Service and preparation of a biological assessment may be required as a condition of this project in order to assess its potential beneficial or adverse effects on bull trout.

Task 2 - Channel Geometry Adjustments

Analyses of stream channel data performed as part of the restoration design process indicated that the Little Blackfoot River is vertically stable throughout the restoration project area, and generally is laterally stable but with localized areas of instability.

The root cause of localized lateral channel instability in the project area is the lack of streamside riparian vegetation, which would otherwise reduce stream bank erosion rates and dissipate flood energy. With the localized extreme rate of bank migration, riparian vegetation on the outside of the meander bends has no opportunity to become established. Eroding banks result in excessive sediment deposition immediately downstream causing increased stress and erosion on the stream banks. In turn, the width/depth ratio of the river is higher than expected (wide and shallow) in these areas. Therefore, while vegetation establishment and geometry adjustment are key to project success, bank stabilization is needed to slow meander migration in certain localized areas in order to give the riparian vegetation time to become established, propagate itself, and act as self-healing bank protection.

The issue of channel slope and sinuosity was examined for the need and opportunity to decrease channel slope and increase sinuosity. Examination of historical photographs and site survey data indicate the existing channel slope is appropriate and that channel plan form has changed little in

more than 40 years. The few areas with channel avulsions have adjusted channel length to approximately pre-avulsion conditions or have unique fish habitat features. In addition, examination of historical channels and cross-sections developed during HEC-RAS modeling indicated no large benefit to channel relocation. Therefore it is recommended to leave the channel slope and sinuosity (plan form) as it presently exists. Field observations and data analysis indicated that the existing channel plan form is appropriate for the Little Blackfoot River

Setting design goals for the proposed Little Blackfoot channel began with a determination of a range of cross-sectional areas for the bankfull channel. Comparison of stage/discharge data from USGS gaging station 12324590 (Little Blackfoot River near Garrison, MT) and HEC-RAS modeling indicated that the 1.5-year return interval agrees with bankfull discharge and the associated cross-sectional area (Land & Water 2004). Therefore, HEC-RAS computed bankfull cross-sectional areas are recommended for the project reach. HEC-RAS modeling results using the existing channel and the 1.5-year return interval flow event are shown in **Tables 3** and **4** below for two sub-reaches of the project area.

Table 3. ***HEC-RAS cross-sectional areas (1.5-year return interval flow event) for the Upper Little Blackfoot River Restoration Project area (lower reach[1]).***

Statistic	Area (ft^2)
Maximum Cross-Sectional Area	94
Minimum Cross-Sectional Area	45
Average Cross-Sectional Area	71
Standard Deviation	9
Average + Standard Deviation	80
Average – Standard Deviation	62

[1] Mike Renig Gulch to Highway 12.

Table 4. ***HEC-RAS cross-sectional areas (1.5-year return interval flow event) for the Upper Little Blackfoot River Restoration Project area (upper reach[1]).***

Statistic	Area (ft^2)
Maximum Cross-Sectional Area	90
Minimum Cross-Sectional Area	45
Average Cross-Sectional Area	63
Standard Deviation	9
Average + Standard Deviation	72
Average – Standard Deviation	54

[1] Telegraph Creek to Mike Renig Gulch.

Based on reference sections and other analyses, a width/depth ratio of 24 is recommended as a design target, with a range of 19-29.

Combining the average cross-sectional area and width/depth ratio presented above, the typical reconstructed cross-section at a riffle in the lower reach would have a bankfull width of 41 feet and an average bankfull depth of 1.7 feet, and the upper reach would have an average bankfull width of 39 feet and a an average bankfull depth of 1.6. Channel disturbance will be minimized

during the installation of bank stabilization features. These bank stabilization features will encourage the stream to adjust naturally to reduce the width/depth ratio (narrower and deeper). These adjustments will improve the channel morphology, sediment transport, and the aquatic habitat. Proposed channel dimensions and bank stabilization structures for a typical channel riffle cross sections are presented in **Tables 5** and **6**.

Table 5. ***Proposed channel riffle geometry (1.5-year return interval flow event) for the Upper Little Blackfoot River from Highway 12 to Mike Renig Creek (lower reach[1]).***

Parameter	Average	Range
Channel Slope	Leave as is.	---
Bankfull Cross-Sectional Area (ft^2)	71	62 to 80
Bankfull Width (ft)	41	39 to 46
Bankfull Depth (ft)	1.7	1.6 to 1.8
Width/Depth Ratio	24	19 to 29

[1] Mike Renig Gulch to Highway 12.

Table 6. ***Proposed channel riffle geometry (1.5-year return interval flow event) for the Upper Little Blackfoot River from Mike Renig Creek to Telegraph Creek (upper reach[1]).***

Parameter	Average	Range
Channel Slope	Leave as is.	---
Bankfull Cross-Sectional Area (ft^2)	63	54 to 72
Bankfull Width (ft)	39	36 to 42
Bankfull Depth (ft)	1.6	1.5 to 1.7
Width/Depth Ratio	24	19 to 29

[1] Telegraph Creek to Mike Renig Gulch.

Adjustment to the channel width/depth ratios described above will be accomplished in localized areas using a combination of techniques including bank-placed root wads, engineered log jams, log vanes and vegetated encapsulated soil layers. These strategically placed treatments will reduce laterally instability and thus allow the stream to adjust naturally by forming a deeper thalweg along the structures. These structures decrease the near-bank shear stress, encourage natural thalweg formation, and increase aquatic habitat. This results in bank and riparian revegetation. Minor channel shaping will occur during construction to encourage natural channel adjustment. This change is channel morphology will improve width/depth ratios, fish habitat, and water temperatures.

Task 3 - Stream Bank Stabilization

Bank stabilization will be addressed using a variety of methods. The methods will attempt to use materials and methods that emulate natural conditions and materials found within the project reach. These methods include the use of bankside vegetation, large woody debris, root wads and rock. Proposed bank treatment locations and individual treatment methods are shown in **Appendix B**. Methods are described in the following paragraphs.

Vegetated Encapsulated Soil Layers: This treatment is shown in **Figure 8** of **Appendix B**. This short-term treatment option consists of two or more biodegradable wrapped layers. The lower wrap(s), up to one foot below bankfull elevation, consists of a cobble/gravel layer encapsulated by a biodegradable geotextile. The cobbles are sized to withstand mobilization except by lower frequency flood events (>10 years). Based on HEC-RAS modeling results, the fill in this layer(s) will have a D_{75} = 6 inches. This lower layer(s) is intended to act as toe scour protection until vegetation can become established and will be set below the existing channel bottom at an elevation equal to the scour of a 10-year recurrence flow event. The upper wrap consists of a 12" thick layer of soil wrapped inside a biodegradable woven geotextile layer. The wrap is filled with available native material (sand/gravel/ cobble) with a topsoil layer for the upper four inches. The geotextile holds the soil in place short-term until vegetation can become established. The geotextile will eventually degrade (3-5 years) such that the channel can migrate at a natural rate, depending on vegetation for stability. The top of the upper bank wrap will be set at the water surface elevation computed for the 1.5-year flow event ("bankfull"). The topsoil layer will be seeded beneath the geotextile and willow sprigs will be installed through the geotextile.

One row of mixed live and dead branches will be placed at or below bankfull for the entire length of the treatment. Branches will serve two purposes: 1) live and dead branches will extend into the stream current to create turbulence and slow the flow of water, and 2) live branches will take root and stabilize the slopes. Branches used will primarily come from two to three species of willow; however, cottonwood branches and possibly dogwood branches will also be mixed in. Each branch will be at least 0.5 inches in diameter and be placed at approximately 2-inch intervals. Some treatment locations will also have containerized mountain alder and/or black cottonwood planted. Transitional and upland ground that is disturbed will be seeded with a native grass mix of 5-8 species. Overall, at least 3,100 cuttings, live branches, and dead branches will be needed.

Root wad Revetment: This treatment is shown in **Figure 8** of **Appendix B**. These revetment systems are composed of root wads, logs, and boulders selectively placed in and along a stream bank. The structures are placed such that half the root wads are below the low water elevation and are incorporated into the bank, with the root wad extending out into the channel. Benefits include reduction in near-bank shear stress, and provision of high quality overhead cover, resting areas, habitat for insects and other fish food organisms, and pool habitat. These structures are to be used in combination with vegetative plantings to stabilize the upper bank and ensure a regenerative source of steam bank vegetation. For each root wad revetment, three mature willows will be transplanted and disturbed ground will be seeded with native grasses.

Task 4 - Fish Habitat Improvements

Fish habitat improvement will be incorporated into bank stabilization. In particular, any structural bank stabilization treatments create hydraulic diversity and provided overhead cover and/or deeper pools, all of which enhance fish habitat. Adjustment of channel geometry through width/depth ratio reduction will result in a narrower/deeper channel, which will provide more holding water for fish. Additionally, improved riparian vegetation will provide overhead cover, which offers security for fish. Narrowing the channel and enhancing overhead cover will both help to reduce the incidence of winter anchor ice, which appears to be a current limitation to

fisheries in the project area. To further enhance fish habitat, additional structures will be constructed in reaches without planned structural bank stabilization treatments. Spacing will be based on channel dimensions and reference reach habitat. Typical fish habitat structures will include root wad structures , log vanes, large woody debris (LWD) jams, and rock clusters (**Figures 4-7, 9**, and **10** in **Appendix B**).. Each of these habitat structures will create hydraulic diversity, pool habitat and, in conjunction with vegetation establishment, overhead cover. For each log vane, at least two mature willows will be transplanted (**Figure 10** in **Appendix B**). These mature willows in combination with the shrub and cottonwood sprigging will create additional overhead cover.

Task 5 – Weed Control

An integrated weed management plan (IWMP) will be key to the success of implementing the Upper Little Blackfoot River Restoration Project because: a) noxious weeds lack the root structure necessary to reduce erosion and maintain stream banks during high energy stream flows, b) noxious weeds are either toxic or provide poor nutritional forage for livestock, deer, and elk, c) ground disturbance created through the process of restoring streams can increase noxious weed populations, and d) state laws specify that it is unlawful for any person to permit any noxious weed to propagate or produce seeds on their land unless the landowner adheres to the noxious weed management program of their county, or has entered into and is in compliance with a written noxious weed management plan for their property (Montana County Noxious Weed Control Law 7-2101-2153).

An IWMP for the project area was developed in 2005 by Land & Water/PBS&J Consulting. The following paragraphs summarize this document titled *An Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project* (PBS&J 2005).

In the document, *An Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project*, the long-term goal is to create a riparian corridor that is resistant to noxious weeds (PBS&J 2005). The five-year goal of this plan is to implement stream restoration without increasing the density or distribution of the five known noxious plants. A successful weed management plan will, in part, result from working with the landowner to coordinate weed control in the riparian corridor with that in the surrounding uplands. The landowner has demonstrated a willingness to work with us on weed control.

Implementation of this weed management plan will help to control noxious weeds through mechanical, chemical, and biological means (PBS&J 2005). Targeted noxious weeds will include: spotted knapweed (*Centaurea maculosa*), yellow toadflax (*Linaria vulgaris*), Canada thistle (*Cirsium arvense*), ox-eye daisy (*Chrysanthemum leucanthemum*), and hound's-tongue (*Cynoglossum officinale*). Invasive exotic weeds that occur within the project area for which partial control may be achieved include: mullein (*Verbascum thapsus*), musk thistle (*Carduus nutans*), and pennycress (*Thlaspi arvense*). The desired riparian communities within the project area include Douglas-fir, black cottonwood, quaking aspen, and willow, while the desired upland communities are native grass / forb meadows. In keeping with the purposes of this stream restoration project, the riparian corridor will be defined as 50 feet on either side of the high water mark. Noxious weed control will focus on stream treatment sites and areas disturbed through

stream restoration activities. However, in order to maintain a riparian corridor that is resistant to noxious weeds, control efforts will also extend to certain upland areas.

Weed Mapping

Noxious weed mapping for the project area was conducted in 2004 and 2005. Plant communities that shared attributes in plant species, noxious weeds, and hydrology were hand-mapped as polygons onto 1995 aerial photographs. Vegetation polygons were mapped if they occurred: 1) within approximately 50 feet of the stream bank and were in or near a proposed stream treatment site, 2) within travel corridors that would be used by equipment for the proposed stream restoration project, or 3) within source locations for whole willow clump transplants and willow sprig collecting. Approximately 63 polygons were then digitized onto the 1995 aerial photographs.

Chemical Control

The *IWMP for the Upper Little Blackfoot Restoration Project* (IWMP) proposes to chemically control noxious weeds for a full growing season in areas that would be disturbed through stream restoration activities. Chemical control would be accomplished by a licensed commercial applicator with the exception that the RV Ranch Manager has an option to conduct spraying on certain upland areas. For both the commercial applicator and RV Ranch Manager, noxious weeds would be spot treated with no broadcast spraying allowed. Based on literature and consultation with the resource experts, at least two chemicals would be used. Noxious weeds within upland areas may be spot treated with a mixture of Tordon/2,4-D while those in more moist polygons may be spot treated with aquatic labeled Rodeo. A washing station will be set-up on the RV Ranch property along Highway 12. The IWMP will make it mandatory for all work vehicles to wash their undercarriage prior to entering the project area and after leaving the project area. Based on the 2005 field work, up to 45 acres of noxious weeds would be treated with Tordon/2,4-D while up to 10 acres would be treated with Rodeo. The project botanist would monitor the environmental conditions, quality of work completed by the commercial applicator, and the effectiveness on noxious weed control. Herbicide application would occur in each of five years. A herbicide plan would be refined each year, based on the previous year's success.

Biological Control

Field work during 2005 revealed that the flower weevil, *Rhinocyllus conicus*, is already at work eating the seeds of musk thistle. Biological control for spotted knapweed and yellow toadflax will be introduced in areas where chemical control will not or cannot be done. The IWMP outlines the types of bio-control to use and the locations for release.

Mechanical Control

The IWMP has identified certain areas where hand-pulling of noxious weeds may need to occur. Herbicide control cannot occur under the canopy of an individual willow; therefore, hand-pulling would occur around willow and alder shrubs identified for transplanting. Noxious and

aggressive exotic weeds would be hand-pulled and placed into a plastic bag prior to moving the uprooted shrub. Hand-pulling may also be done at stream treatment sites, once the work is completed.

Revegetation Control

Through plantings of native plants, noxious weeds will be partially controlled because: 1) a larger number of native plants will be present to compete against noxious weeds for water and nutrient resources, 2) shrubs like willows will create shade which is a deterrent to noxious weed growth, and 3) shrubs along the stream bank will slow down the river's current velocity while creating microhabitats that are too moist for noxious weed monocultures to establish. For more detail see *Task 6-Revegetation* of this proposal.

Noxious Weed Control from Fencing

Fencing will facilitate the ability for noxious weeds to be controlled. Fencing will prevent cattle from spreading noxious weed seed into areas disturbed by stream restoration activities. Fencing will temporarily remove grazing pressures that are currently limiting willow growth and reproduction. Livestock grazing has compacted soils along the stream bank which in turn has hindered willow establishment and growth. In many mapped vegetation polygons, willows of 18 to 24 inches are common, but their ability to grow is hampered by livestock grazing and trampling. Consequently, these polygons have drying soils and receive more sunlight creating a better environment for noxious weeds to grow.

Task 6 – Revegetation

Native plants will be used in this project: a) to strengthen stream bank stability through root growth, b) to provide foliar cover that shades the stream and cools the water temperature, c) to slow streamflow and provide in-stream structures to create fish micro-habitats, and c) to compete against noxious weeds. Following at least a growing season's worth of weed control, revegetation will occur at all bio-engineering sites and at some noxious weed sites within the riparian corridor (**Figures 4** to **7** in **Appendix B**). A list of potential native plants that are appropriate for the site conditions and project goals has been developed (**Table 7**).

Table 7. ***Potential plant species to use for revegetating riparian habitat.***

Scientific Name	Common Name	Scientific Name	Common Name
Agropyron riparium	stream bank wheatgrass	*Glyceria grandis*	American mannagrass
Agropyron dasystachyum	thick-spike wheatgrass	*Juncus balticus*	Baltic rush
Agropyron trachycaulum	slender wheatgrass	*Juncus effusus*	soft rush
Alnus incana	mountain alder	*Juncus ensifolius*	dagger-leaf rush
Alopeucureus pratensis	meadow foxtail	*Poa sandbergii*	Sandberg bluegrass
Beckmannia syzigachne	American sloughgrass	*Populus tremuloides*	quaking aspen
Bromus marginatus	mountain brome	*Populus trichocarpa*	black cottonwood
Carex aquatilis	water sedge	*Prunus virginiana*	chokecherry
Carex microptera	small-winged sedge	*Ribes* spp.	currant
Carex rostrata	Beaked sedge	*Rosa* spp.	rose
Carex spp.	Sedge	*Salix boothii*	Booth willow

Table 7 (Continued). ***Potential plant species to use for revegetating riparian habitat.***

Scientific Name	Common Name	Scientific Name	Common Name
Carex utriculata	Beaked sedge	*Salix drummondiana*	Drummond willow
Cornus stolonifera (*C. sericea*)	red-osier dogwood	*Salix exigua*	sandbar willow
Crataegus douglasii	black hawthorne	*Salix lemmonii*	Lemmons willow
Deschampsia caespitosa	tufted hairgrass	*Scirpus microcarpus*	small fruit bulrush
Elymus lanceolatus	stream bank wheatgrass	*Stipa comata*	needle-n-thread grass
Elymus canadensis	Canada wildrye	*Stipa viridula*	green needlegrass
Elymus glaucus	blue wildrye	*Symphoricarpos albus*	common snowberry

Our revegetation strategy, though discussed under various sections within this proposal, is summarized below:

• Mature willow clumps will be transplanted from an extensive willow complex within the project area using NRCS methods (Hoag 2003). Shrubs within 50 feet of either stream bank will not be used for transplant; rather willows will be removed from areas that would not compromise stream bank stability.

• Areas that serve as the source for mature willow transplants will be graded, seeded with native grasses, and protected with erosion control after disturbance. Soil may be needed to help grade these areas and would come from either stream bank restoration efforts or from another local source.

• Approximately 24 mature willow transplants will be obtained off the RV Ranch and used in conjunction with 12 rootwad revetments.

• Approximately 56 mature willow transplants will be obtained off the RV Ranch and used in conjunction with 28 log vane Structures.

• Approximately 72, five-gallon containerized woody plants will be bought from a nursery and planted along the stream bank. Most of these will be willow with lesser amounts of cottonwood, alder, chokecherry, and/or dogwood. A small percentage may be upland shrubs (rose, snowberry) planted on the terrace above the river.

• Approximately 5000 willow sprigs (mixed live and dead branches) of 0.5 inch diameter by 3-5 feet long will be collected on-site from the willow complex. These sprigs will be used in the vegetated encapsulated soil layers (bank wraps) employing methods developed by Georgia Soil and Water Conservation Commission (2000).

• Approximately 30 acres of disturbed ground would be seeded with native grasses. Such areas include: 1) sites where mature willows are removed, 2) treatment sites for bank wraps, log vanes, and rootwad revetments, and 3) certain noxious weed polygons where a monoculture has developed. Two native seed mixes will be used; one seed mix will be used on moist sites and one on drier upland sites.

Task 7 – Grazing Management

Improved management of livestock grazing in the project area will help ensure the long-term success of the restoration efforts. Livestock management will be accomplished through riparian fencing and development of a grazing management plan for the project area.

Presently, the entire project area falls within one pasture. One fence line exists along the east side of the Little Blackfoot Road and another fence line follows the south side of Highway 12. At certain intervals during the growing season, between 150 and 380 cows, calves, or yearlings have unlimited access from the Little Blackfoot Road east to the ridgeline and from Highway 12 south to Telegraph Creek. Water sources for cattle include the Little Blackfoot River, Telegraph Creek, and Mike Renig Creek, in addition to several gravel pits/springs located on the mountain slope east of the Little Blackfoot River.

Fencing would be used as a management tool to exclude livestock in order to remove grazing pressures that may trample and inhibit growth of newly planted vegetation. The new fencing strategy was proposed by Mr. Enger, manager of the RV Ranch (**Figure 11** in **Appendix B**). The new fence strategy would exclude cattle activity for 5 years on approximately 9750 feet of stream and on at least 190 acres of property. About 4034 feet of stream would remain available to cattle during these 5 years.

The proposed fence would tie into an existing fence that is located on the terrace east of the stream and in the vicinity of a watering hole (gravel pit) (see **Figure 11** in **Appendix B)**. From this connection, the proposed fence would follow the edge of the upper terrace in as straight a line as possible. The proposed fence would cross several branches of Mike Renig Creek and end on the terrace above approximate River Station 1442+00. From this point on the terrace, the fence would extend southwest, cross the stream, and tie into an existing fence that separates the RV Ranch and Therriault Ranch properties.

The fence construction is designed to exclude cattle, but would allow for deer and elk passage (**Figure 12** in **Appendix B**). Fences that allow for wildlife passage will reduce animal deaths and require less fence maintenance. Cattle fences that are wildlife friendly must be less than 42 inches tall, have at least 12 inches between the top two wires to prevent hind legs from getting entangled, and have 16 inches of bottom clearance for fawns to crawl under (Colorado Division of Wildlife 2005). The proposed fence would be constructed of metal posts, spaced 15-20 feet apart, with 3-barbed wires (**Figure 12** in **Appendix B**). Height of the top barbed wire would be at 38 inches with the middle wire at 26 inches and the lower wire at 16 inches (**Figure 12** in **Appendix B**).

The proposed fence alignment crosses the Little Blackfoot River at approximate Station 1542+00. Fence construction at the stream crossing will be designed to exclude livestock, but to allow debris (logs, rocks) to move downstream. Probable design will consist of a cable that spans the river's width and extends about four feet above the water. Suspended from the cable are hinged panels with 6x6 inch grids.

Fence construction would be sub-contracted and would occur before bio-engineering work has started. The project botanist will write a "request for bid" on fence construction. The fencing plan and a walk-through of the fencing project would be offered to potential bidders. Bids would be reviewed by the RV Ranch manager and Land & Water Consulting/PBS&J. It is estimated that up to approximately 20 days may be required to construct the fence.

Task 7 – Public Education

Project demonstration tours will be conducted for purposes of demonstrating overall project benefits and restoration methodologies to area landowners, watershed stakeholders, project sponsors and cooperators, and the interested public. Timing and details of the tour(s) will be planned with Natural Resources Damage Program staff and will be closely coordinated with the Upper Clark Fork River Basin Remediation and Restoration Education Advisory Council.

D. Project Time Schedule

The proposed restoration project includes a sequence of events commencing in early-2007 and ending in late-2011, as follows. The complete project funding package will be pursued in 2006. Contingent upon funding, subcontractor selection, preparation of final construction plans and specifications, and environmental permitting will occur in early 2007. Pre-restoration weed controls and riparian fencing will commence in spring 2007 with actual construction beginning in spring 2008. Ongoing weed controls and riparian revegetation will continue through 2011. Development of a grazing management plan will take place during the construction activities and will be completed prior to the end of the 5-year cattle exclosure period. Project effectiveness monitoring will include "before" restoration studies in 2007 and "after" implementation evaluations in 2009-2011. Public demonstration tours of the project area will be conducted during the 2009-2011 post-implementation period.
The project timetable is summarized in **Table 8** below.

Table 8. ***Timetable for the Upper Little Blackfoot River Restoration Project.***

Activity – Calendar Year	2007	2008	2009	2010	2011
Arrange Funding					
Subcontracting					
Final Plans and Specifications					
Permitting					
Weed Controls					
Fence Construction					
Stream Channel Restoration					
Fish Habitat Enhancements					
Riparian Planting					
Grazing Management Plan					
Effectiveness Monitoring					
Public Demonstration Tours					
Final Project Reporting					

E. Project Methods and Technical Feasibility

The Upper Little Blackfoot River Restoration Project was selected based on an assessment of conditions and a prioritization of problems throughout the river corridor. The project represents an initial step in a multi-phased restoration plan for the entire river, as well as a demonstration of methods for restoring channel integrity, stream bank stability, and fish and riparian habitat that can be applied elsewhere in the Little Blackfoot corridor. A detailed analysis of the project area has been completed and a restoration plan has been prepared using state-of-the-art science and restoration techniques. Project methods have been generally described in the Implementation Plan section of this application (**Section C.**), and are described in more detail in the Upper Little Blackfoot River Restoration Project report (Land & Water/PBS&J 2005).

The Deer Lodge Valley Conservation District completed the original assessment of the Little Blackfoot River, the Upper Little Blackfoot River Restoration Project plan, and the Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project in partnership with Land & Water Consulting (LWC), a Division of PBS&J. LWC has more than 11 years of experience designing and implementing stream restoration projects using fish friendly techniques to improve stream channel stability and fisheries habitat. LWC has preformed stream stability assessments and/or channel restoration/stabilization on hundreds of miles of river. A list of clients is available upon request with related project information.

The Upper Little Blackfoot River Restoration Project's stream bank stabilization and habitat improvement techniques will use natural material and native vegetation to achieve project goals. The project will use vegetated encapsulated soil layers, root wad revetments, log vanes, rock clusters, constructed log jams, mature transplants and vegetation plantings to stabilize stream banks and improve fisheries habitat. These techniques are described in Rosgen (1996) and USDA (1998) (see **Section H.** Supporting Documents) and have been used on numerous stream restoration projects. All structures will be installed to withstand at least the 10-year event, placed for optimal function at the stream's bankfull discharge level, installed to withstand at least the current sediment levels (bedload movement), and designed to achieve restoration and habitat goals. The proposed methods have been shown to be successful on similar channel restoration/habitat enhancement projects designed and constructed by LWC and other.

All tasks requiring stream stabilization or renaturalization will be contracted to Land & Water/PBS&J, who have been pre-qualified by the Montana Department of Administration, Montana Fish, Wildlife and Parks, and Montana Department of Transportation to perform land use planning, stream restoration, revegetation, wetland mitigation, and effectivenesss monitoring services. Land & Water will also be responsible for providing final design and construction oversight as well as coordination of effectiveness monitoring activities.

Land & Water/PBS&J has developed longitudinal profiles, current and proposed channel profiles, typical cross-sections and plan view diagrams of all proposed structures, and conducted hydraulic modeling for sediment transport. All calculations and hydrological information, as well as channel cross sections, profiles, diagrams of channel modifications, locations of habitat improvement structures, bank stabilization structures, and revegetation efforts are documented in

the Upper Little Blackfoot River Restoration Project plan and shown to be technically feasible through similar restoration projects.

Riparian revegetation is a critical component of the Upper Little Blackfoot River Restoration Project. We propose to complete a year of weed control, using herbicides and biological control, prior to implementing ground-disturbing activities. This weed control will be done by a commercial applicator and will occur in all access corridors and at all sites proposed for disturbance. The commercial applicator must qualify according to criteria stated in the report, *An Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project*. Revegetation work will be accomplished by PBS&J staff and sub-contractors who have expertise in harvesting and planting. Only native plant species that occur within the Little Blackfoot river corridor will be planted within the project area. All mature willow clumps will be transplanted from a large willow complex within the project area using NRCS methods (Hoag 2003). Willow sprigs will be collected on-site within the large willow complex by PBS&J Botanists and sub-contracted revegetation specialists (Georgia Soil and Water Conservation Commission 2000). Additional 5-gallon shrubs of species listed in **Table 7** and cottonwood trees will be bought from a nursery and planted in the appropriate microsite using standard methods by qualified revegetation specialists/botanists. Two native grass seed mixes will be developed for dry upland and moist areas and will be applied using standard methods by qualified botanists. Revegetated areas and noxious weed establishment will be monitored twice a year by the PBS&J project botanist for a 5-year period. Revegetation monitoring will assess growth and mortality of planted and seeded species. The cause of any plant mortality will be assessed so that any re-plantings do not also result in mortality. The Botanist may organize a group of volunteers to hand-pull weed noxious plants if they occur in areas inappropriate for herbiciding by a commercial applicator and are in a relatively confined population. Seeded areas will be monitored twice a year for germination/growth and for presence of noxious weeds. Noxious weed control in seeded areas will come about through hand-pulling by organized volunteer groups or through herbiciding by the commercial applicator.

The restoration design will be reviewed and approved by the landowners, Natural Resource Damage Program, MFWP, USFWS, and NRCS.

F. Project Effectiveness Monitoring Plan

An adequate monitoring program is necessary to confirm that project design criteria are fulfilled and restoration goals are attained. The monitoring program will need to be extensive enough to document project success without spending excessive amounts of time and money that could be better spent on other restoration projects. The following monitoring strategy has been developed to ensure that the Upper Little Blackfoot River Restoration Project is fully implemented and that desired results are achieved, quantified, and documented.

A “before-and-after” evaluation of the restoration project will be performed as a component of project implementation. Monitoring goals include documenting channel morphology characteristics (channel type, gradient, Wolman pebble counts, width/depth and entrenchment ratios, and sinuosity), riparian index (NRCS method), aquatic habitat criteria (pool frequency,

large woody debris frequency, riffle/pool ratios), water quality (suspended sediment, turbidity, water temperature/recording thermographs), and fish population characteristics (species, densities and spawning surveys). We propose to take advantage of fish population data, spawning surveys, and any aquatic habitat information generated by Montana Fish, Wildlife and Parks as part of this project effectiveness monitoring strategy. Upstream-to-downstream contrasts will be established in order to document the site-specific benefits of this project in relation to the entire river corridor. Additional vegetation monitoring will be performed and land use activities and potential impacts will also be evaluated.

The terrestrial, vegetation, and aquatic components will be monitored on an annual basis for a minimum period of five years. Re-establishment and regeneration of the woody riparian vegetation and reduction of eroding stream banks will be the focus of the riparian assessments. At specific transects, photo points will be established and GPS recorded for replication. Time series photos will allow for visual evaluation and vegetation evaluation forms will be developed for review. Monitoring land management actions within the fenced project area will be completed annually. Items to monitor within the fenced project area may include fence damage, presence or sign of livestock use, and presence of newly deposited man-made materials. Currently, baseline data shows a lack of riparian vegetation. Basic success (or failure) of the project would be determined by measuring riparian vegetation establishment (or lack thereof). The greenline, which is the length of perennial vegetation on or near the water's edge would be measured and compared to baseline conditions or to the previous year's measurements. The success of establishing riparian vegetation will be monitored using measures of cover and stem densities for shrubs, trees, grass, and exotic plant species and by conducting survival counts for transplanted mature willows and sprigged woody vegetation.

Pre-project monitoring would commence in 2007 following notice of approval of implementation grant funding. Seasonality issues will need to be considered, for example spawning surveys for fall spawning brown trout would need to take place in autumn. Other monitoring elements will need to be performed during a base flow period to correspond to the original 2001 Little Blackfoot assessment that established the project site as a priority for attention. A complete data set for all of the variables of interest will be compiled prior to initiation of construction activities in 2008. Existing representative data that may already be available from cooperating agencies, or which were gathered to assist in this project design, will be used wherever possible in order to reduce costs.

Post-construction monitoring will be performed for five consecutive years beginning in 2008. Natural Resource Damage Program staff and cooperating agencies will be consulted prior to data collection activities in order to ensure proper timing and to avoid duplication of effort. Full benefits of project implementation may not be realized for up to a decade, while vegetation matures and fisheries rebound. It will be important to document temporal trends during this period, as well as project endpoints.

Summary reports on the project's progress, including results of the monitoring program, will be prepared annually. The annual reports will be distributed to project sponsors and to others upon request. The reports will describe the progress of proposed restoration activities. A summary and evaluation of water quality, fish population and habitat monitoring data will be developed in

each annual report. Of particular importance will be vegetation and stream channel attributes, fish population data, and water quality information. Statistically significant differences will be apparent only after several years of post-project monitoring, but interim data will assist the project sponsors in evaluating the effects of on-going and recently completed restoration work. Annual meetings are anticipated between the restoration project team (Deer Lodge Valley Conservation District, cooperators, landowners, and consultants) and Natural Resource Damage Program staff and other sponsors. The purpose of these meetings will be to review the annual project effectiveness monitoring results in relation to the project goals, objectives, and various implementation elements and to discuss any needed modifications.

G. Qualifications of the Project Team

The Deer Lodge Valley Conservation District will administer the project grants and coordinate the various reporting requirements. The restoration project contractor will lead the implementation of the project because their personnel have developed the specific plans for the Upper Little Blackfoot River Restoration Project and they are committed to completing this project. Staff involved with the 2001 river-wide assessment, the 2005 restoration design, and the 2005 integrated weed management plan have established excellent working relationships with the Deer Lodge Valley and Lewis and Clark County Conservation District, the project area landowners, and cooperating agencies, including Montana DEQ, DNRC, FWP, NRCS, Helena National Forest, and others. The project contractors have many years of experience in managing large restoration projects, soliciting project funds, evaluating potential project outcomes, constructing projects and monitoring the success of the projects. Staff resumes, statements of qualification, and descriptions of past projects are available upon request.

H. Supporting Technical Documentation

Riparian and stream channel restoration methods have been documented in numerous publications as well as the Upper Little Blackfoot River Restoration Project plan. The information sources listed below were used in developing the restoration plan and/or have been cited in this application. Copies of these documents can be obtained by contacting the Deer Lodge Valley Conservation District. Photographs, maps and other technical information pertaining to this project are included in **Appendices A** and **B**.

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Step 4. Environmental Impact Checklist and Narrative

Impacts to Physical Environment	No Impact	Potentially Adverse	Potentially Beneficial	Permits or Approvals Required	Mitigation Required
Soil suitability, geological or topographic constraints	X				
Air quality	X				
Groundwater resources and quality			X		
Surface water quality, quantity and distribution systems		X Short term	X Long term	CD 310, DEQ 318, DEQ storm water MPDES permits	
Floodplains and floodplain management			X	County Floodplain permit	
Wetlands protection			X	COE 404 permit	
Terrestrial and avian species and habitats		X Short term	X		
Aquatic species and habitat		X Short term	X		
Vegetation quantity, quality and species			X		
Unique, threatened or endangered species or habitats			X	FWS Sec 7 consultation	
Unique natural features	X				
Historical and archeological sites	X				
Aesthetics, visual quality			X		
Energy resources, consumption, and conservation	X				

Comments:

Implementation of the Upper Little Blackfoot River Restoration Project could have some very short-term negative impacts to the physical environment. Stream channel and stream bank restoration measures and placement of fish habitat structures will cause temporary impacts to water quality and perhaps aquatic habitat in the Little Blackfoot River, including increased suspended sediment and turbidity and localized displacement of fish. Vegetation will also be disturbed and soils exposed in willow transplant and revegetation areas. This could minimally impact terrestrial and avian species and their habitats. To minimize sediment inputs during construction, in-stream work will take place during low flow periods (late summer, fall and/or winter). Also, when appropriate, silt fencing or other means will be used to isolate the work area from flowing water. The Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project includes several measures to prevent the spread of noxious weeds in denuded areas and to prevent groundwater contamination. Some of the measures include: 1) washing vehicles before and after they enter into the project area, 2) using chemical types and formulations appropriate for aquatic systems, 3) using a backpack to spot treating individual plants, 4) using a "loop" type applicator to prevent chemical contact with the soil, and 5) applying the herbicide during the dry time of the year. The corridor used to access the stream bank does have some swales that collect water and have wetland vegetation. These narrow swales would be covered by fabric upon which temporary fill would be placed. This will prevent soil compaction and disturbance to the swales during the four-week time of project implementation. The temporary fill and fabric would be removed after the restoration/revegetation work is completed. In vicinity of ground disturbing activities, wetlands will be surveyed for and delineated by a qualified wetland specialist. Coordination with contractors will occur to insure that wetlands are not disturbed nor equipment or fuels placed within 100 feet of wetlands. Silt fencing may also be used if it is determined that a wetland occurs nearby to ground disturbing activities. The project contractor will be responsible for acquiring all necessary local, state, and federal permits required for this project, and all requirements of these permits will be fully adhered to minimize environmental impacts during project implementation.

The Upper Little Blackfoot River Restoration Project will improve water quality, aquatic and terrestrial habitats, and riparian conditions of the Little Blackfoot River. The project will have an overall benefit to the river and the State of Montana. The project will improve fish and wildlife habitat, reduce sediment and possibly nutrient inputs, improve water quality, and restore channel integrity and riparian vegetation in 2.6 miles of the upper Little Blackfoot River. Although some short-term environmental impacts may occur during implementation, the final product will have only positive long-term impacts on the Little Blackfoot watershed.

Impacts to Human Environment	No Impact	Potentially Adverse	Potentially Beneficial	Permits or Approval Required	Mitigation Required
Human Health and Safety	X				
Agricultural or industrial production			X		
Access to recreational activity, public lands, open space	X				
Nuisances (odor, dust, glare)	X				
Noise (e.g. separation between housing and construction areas	X				
Hazardous substance handling, transportation and disposal	X				
Local and state tax base and tax revenue	X				
Employment, population, or housing	X				
Industrial and commercial activity			X		
Land use compatibility; Consistency with local ordinances, or solutions, or plans			X		
Demands for governmental services (e.g. site security, fire protection, community water supply, wastewater or stormwater treatment, solid waste management)	X				
Transportation networks and traffic flow	X				
Social structures and mores	X				
Cultural uniqueness and diversity	X				

Comments:

Implementation of the Upper Little Blackfoot River Restoration Project is not expected to have any adverse impacts to the human environment. To the contrary, the project is expected to have longer-term positive impacts by: 1) improving the overall agricultural productivity of the project area through weed controls and revegetation, 2) by potentially stimulating the local economy through improved fishing and recreational opportunities, and 3) by furthering the goals of the

Little Blackfoot Watershed Group to incrementally restore the Little Blackfoot River corridor and watershed.

Step 5. Criteria Statements

Applicant Name: Deer Lodge Valley Conservation District

Project Title: Upper Little Blackfoot River Restoration Project

1. Technical Feasibility

The Upper Little Blackfoot River Restoration Project was selected based on an assessment of conditions and a prioritization of problems throughout the river corridor. The project represents an initial step in a multi-phased restoration plan for the entire river, as well as a demonstration of methods for restoring channel integrity, stream bank stability, and fish and riparian habitat that can be applied elsewhere in the Little Blackfoot corridor. A detailed analysis of the project area has been completed and a restoration plan has been prepared using state-of-the-art science and restoration techniques. Project methods have been generally described in the Implementation Plan section of this application (**Section C.**), and are described in more detail in the Upper Little Blackfoot River Restoration Project report (Land & Water/PBS&J 2005).

The Deer Lodge Valley Conservation District completed the original assessment of the Little Blackfoot River, the Upper Little Blackfoot River Restoration Project plan, and the Integrated Weed Management Plan for the Upper Little Blackfoot River Restoration Project in partnership with Land & Water Consulting (LWC), a Division of PBS&J. LWC has more than 11 years of experience designing and implementing stream restoration projects using fish friendly techniques to improve stream channel stability and fisheries habitat. LWC has preformed stream stability assessments and/or channel restoration/stabilization on hundreds of miles of river. A list of clients is available upon request with related project information.

The Upper Little Blackfoot River Restoration Project's stream bank stabilization and habitat improvement techniques will use natural material and native vegetation to achieve project goals. The project will use vegetated encapsulated soil layers, root wad revetments, log vanes, rock clusters, constructed log jams, mature transplants and vegetation plantings to stabilize stream banks and improve fisheries habitat. These techniques are described in Rosgen (1996) and USDA (1998) (see Section H. Supporting Documents) and have been used on numerous stream restoration projects. All structures will be installed to withstand at least the 10-year event, placed for optimal function at the stream's bankfull discharge level, installed to withstand at least the current sediment levels (bedload movement), and designed to achieve restoration and habitat goals. The proposed methods have been shown to be successful on similar channel restoration/habitat enhancement projects designed and constructed by LWC and other.

All tasks requiring stream stabilization or renaturalization will be contracted to Land & Water/PBS&J, who have been pre-qualified by the Montana Department of Administration, Montana Fish, Wildlife and Parks, and Montana Department of Transportation to perform land

use planning, stream restoration, revegetation, wetland mitigation, and effectivenesss monitoring services. Land & Water will also be responsible for providing final design and construction oversight as well as coordination of effectiveness monitoring activities.

Land & Water/PBS&J has developed longitudinal profiles, current and proposed channel profiles, typical cross-sections and plan view diagrams of all proposed structures, and conducted hydraulic modeling for sediment transport. All calculations and hydrological information, as well as channel cross sections, profiles, diagrams of channel modifications, locations of habitat improvement structures, bank stabilization structures, and revegetation efforts are documented in the Upper Little Blackfoot River Restoration Project plan and shown to be technically feasible through similar restoration projects.

Riparian revegetation is a critical component of the Upper Little Blackfoot River Restoration Project. We propose to complete a year of weed control, using herbicides and biological control, prior to implementing ground-disturbing activities. This weed control will be done by a commercial applicator and will occur in all access corridors and at all sites proposed for disturbance. The commercial applicator must be licensed and certified. Revegetation work will be accomplished by PBS&J staff and sub-contractors who have expertise in harvesting and planting. Only native plant species that occur within the Little Blackfoot river corridor will be planted within the project area. All mature willow clumps will be transplanted from a large willow complex within the project area using NRCS methods (Hoag 2003). Willow sprigs will be collected on-site within the large willow complex by PBS&J botanists and sub-contracted revegetation specialists (Georgia Soil and Water Conservation Commission 2000). Additional 5-gallon shrubs of species listed in **Table 7** and cottonwood trees will be bought from a nursery and planted in the appropriate microsite using standard methods by qualified revegetation specialists/botanists. Two native grass seed mixes will be developed for dry upland and moist areas and will be applied using standard methods by qualified botanists. Revegetated areas and noxious weed establishment will be monitored twice a year by the PBS&J project botanist for a 5-year period. Revegetation monitoring will assess growth and mortality of planted and seeded species. The cause of any plant mortality will be assessed so that any re-plantings do not also result in mortality. The botanist may organize a group of volunteers to hand-pull weed noxious plants if they occur in areas inappropriate for herbiciding by a commercial applicator and are in a relatively confined population. Seeded areas will be monitored twice a year for germination/growth and for presence of noxious weeds. Noxious weed control in seeded areas will come about through hand-pulling by organized volunteer groups or through herbiciding by the commercial applicator.

The restoration design will be reviewed and approved by the landowners, Natural Resource Damage Program, MFWP, USFWS, and NRCS.

2. Relationship of Expected Costs to Expected Benefits

Direct and Indirect Costs

Direct costs associated with implementing the Upper Little Blackfoot River Restoration Project include NRDP project implementation grant funding, and sponsor and project partner match

contributions. These costs are quantified in the budget section of this application. Indirect costs include review time for final restoration designs, permit applications, and general consultation by project advisors and agency representatives. Contributions of time and materials on the part of affected landowners, watershed group members, and volunteers to track and assist with the project are additional indirect costs.

Direct and Indirect Benefits

Direct benefits of this project include all of the following: improved fish habitat, improved stream bank stability, restored riparian vegetation and riparian wildlife habitat, decreased sediment loading and in-stream sedimentation, improved water quality, decreased water temperatures, increased production of aquatic insects, and reduced losses of agricultural land and soils in 2.6 miles (about 8 percent) of the privately owned portion of the Little Blackfoot River. The project will also potentially improve water quality in downstream reaches of the Little Blackfoot River, and facilitate fish passage between reaches of the Little Blackfoot River located upstream and downstream of the project area. The State of Montana will benefit through increased fish and wildlife habitat and improved water quality. The project will build positive working relationships between landowners, conservation districts, government and non-governmental entities, and the general public.

Indirect benefits include enhanced recreational opportunities and uses in the Little Blackfoot River, including improved fishing. Other indirect benefits include maintaining Little Blackfoot restoration project momentum, public interest and landowner support for Little Blackfoot restoration efforts, and providing demonstrations of stream restoration and fish habitat enhancement methods and benefits. As has been previously stated, this restoration project will be utilized as a demonstration project to other landowners in the Little Blackfoot watershed. Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group anticipate pursuing opportunities with these landowners to develop additional restoration designs based on the success of this project.

Although this restoration effort is on private lands, the Montana Stream Access Law allows the public to utilize the restored reach of the Little Blackfoot River. Public access is available at the downstream end of the restoration project boundary at the U.S. Highway 12 crossing. Another access point is at a county road bridge crossing located about 1.0 stream miles upstream of the project boundary. The project area is on lands owned almost exclusively by the RV Ranch. Access to the ranch property for fishing and hunting is freely granted with permission from the ranch manager and this condition is not expected to change.

3. Cost-Effectiveness

Several alternative approaches to attaining the project goals and objectives were considered for the project reach including the following.

1. A “no action” alternative is reflected in the current situation and is not a viable alternative for attaining the desired project goals within any reasonable period of time. Historical flood damage, and stream channel and bank alterations took place many years ago and

the river has not recovered to any significant degree. While channel sinuosity in the Little Blackfoot River as a whole has increased over the past two decades due to natural tendencies of the river, riparian condition and aquatic habitat in the project area remains very poor.

2. Using only riparian fencing and livestock exclusion throughout the project area was also considered. Given enough time, perhaps decades, the river may begin to stabilize and reverse the current trend. However, in the interim period sediment loading, poor water quality, degraded fish and riparian habitat, and decreased human uses will persist. Therefore the time to reach the project goals was determined to be too long for this option.
3. Relocation of the entire channel was considered. This option would relocate portions of the channel back to historical meanders where there is dense riparian vegetation and better access to the floodplain. One reason for considering this option was the preconceived notion that the river had been at this elevation in the past two to four decades. Examination of historical aerial photographs shows no indication of significant channel relocation within the past 50 years. Further examination indicated that large section of the new channel would still require bank stabilization techniques similar to those for the preferred alternative. Finally, the cost of this option was estimated to be more that four times that of the preferred alternative with minimal additional benefits.
4. Widening the floodplain for certain portions of the project reach was also considered in addition to the proposed stabilization/habitat enhancement measures. The initial impression was that certain reaches were incised and would benefit from access to a wider floodplain. Subsequent hydraulic modeling indicated that the floodplain width is adequate in these reaches and that the cost of moving large volumes of soil was not justified by the minimal return in project improvement.
5. The preferred alternative would leave the existing channel in place, make adjustments to channel geometry, stabilize actively eroding banks (sediment reduction), enhance fish habitat, restore and protect riparian vegetation. Livestock management will be improved through riparian fencing and development of a grazing management plan. Weeds will be controlled through aggressive implementation of an integrated weed management plan. This overall approach is cost effective, proactive, and provides momentum and support to the efforts of the Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group to systematically address problems throughout the river.

4. Environmental Impacts

The environmental impact checklist indicates that up to three criteria may experience short-term negative impacts. These include surface water quality, terrestrial habitats, and aquatic species and habitats stemming from short-term construction activities. Aggressive measures will be undertaken to minimize these impacts and all required environmental permits will be adhered to. Overall, the long term environmental benefits to restoration of this reach, including improved water quality, and enhanced aquatic life, fisheries and riparian resources, far outweigh the temporary negative impacts of the project.

5. Human Health and Safety Impacts

Implementation of the Upper Little Blackfoot River Restoration Project is not expected to have any adverse impacts to human health or safety. Positive impacts include improved water quality, enhanced aquatic life, fisheries and riparian resources, and perhaps a reduced risk of flood damage to downstream homes and property resulting from improved channel integrity and floodplain characteristics.

6. Results of Superfund Response Actions

Any results or anticipated results of Superfund response actions underway, or anticipated, will not have any influence on the Upper Little Blackfoot River Restoration Project. The project will not duplicate the effects of a response action on natural resources or services in the UCFRB. The project does not fall within the locations specified in the Upper Clark Fork River Operable Unit between Warm Springs Ponds and Milltown Reservoir. There are no ongoing or planned response actions that we are aware of that affect or may affect the natural resources or services provided by this project.

7. Recovery Period and Potential for Natural Recovery

The natural recovery period for the upper Little Blackfoot River is anticipated to take several decades or longer in the absence of focused restoration measures. Livestock fencing is absent and this would be needed to accomplish effective grazing management and the recolonization of bank stabilizing riparian vegetation. Noxious weeds are not presently controlled within the riparian corridor of the project area and these will also continue to prevent the re-establishment of more desirable plants. Given these limitations, problems with stream channel and bank stability and fish habitat limitations are unlikely to self-correct within and reasonable length of time. This restoration project has been designed to provide measurable improvements in condition within a three-year timeframe.

8. Applicable Policies, Rules and Laws

The project contractor will secure all necessary local, state and federal permits required to implement the Upper Little Blackfoot River Restoration Project, including: U.S. Army Corps of Engineers 404 permit, Deer Lodge Valley Conservation District 310 permit, Montana Department of Environmental Quality 318 permit, and US Fish and Wildlife Service Section 7 consultation.

All permits will be acquired at least 30 days prior to task implementation and will be on file at the Deer Lodge Valley Conservation District office. Deer Lodge Valley Conservation District and the project contractor will implement the project in coordination with the Natural Resource Conservation Service (NRCS), Montana Fish, Wildlife and Parks (MFWP), the Natural Resource Damage Program (NRDP), and the private landowners of the project reach.

Anticipated project cooperators include the landowners, the Little Blackfoot Watershed Group, NRCS, MFWP, NRDP, the Montana Department of Natural Resources and Conservation, Montana DEQ, the Pat Barnes Chapter of Trout Unlimited, the Clark Fork Coalition, the Upper Clark Fork River Basin Steering Committee, the Tri-State Water Quality Council, and the Helena National Forest. The project has been presented and approved by the Deer Lodge Valley Conservation District board of supervisors.

The project contractor, PBS&J, will lead the implementation of the project because their personnel have developed the specific restoration plans and they remain committed to completing this multi-year project. The contractor has established excellent working relationships with the landowners, the agencies, and the aforementioned cooperators. The contractor has many years' experience in designing and implementing stream restoration projects, managing project budgets, and monitoring project effectiveness.

Summary reports on the project's progress will be prepared on a monthly or quarterly basis for the Natural Resources Damage Program, other sponsors, and interested cooperators. Annual monitoring reports describing the project effectiveness will be prepared beginning in year three of the project. Pre-restoration conditions will be documented in a monitoring report prepared at the end of the first year of the project. The monitoring reports will be distributed to the Natural Resources Damage Program, the NRCS, MFWP, other sponsors, and interested cooperators.

9. Resources of Special Interest to the Tribes and DOI

The Upper Little Blackfoot River Restoration Project area does not contain any known cultural resources or other resources of special interest to the Tribes of the U.S. Department of the Interior. In addition, the planned activities do not involve major construction or excavation activities that would be expected to disturb cultural resources if they are present. Deer Lodge Valley Conservation District will consult with NRCS personnel to evaluate the need for conducting cultural resource evaluations within the project area. Should cultural resource issues be identified, Deer Lodge Valley Conservation District will follow NRCS recommendations for avoiding impacts to any cultural resource areas. In that event, both the State Historical Preservation Office and the Natural Resources Damage Program will be informed and consulted prior to pursuing any construction activities within the project area.

General Policy Stage 2 Criteria

10. Project Location

The Upper Little Blackfoot River Restoration Project includes approximately 2.6 miles of the Little Blackfoot River beginning at the confluence of Telegraph Creek and continuing downstream to the U.S. Highway 12 crossing one-half mile east of Elliston, MT. The Little Blackfoot River is a tributary of the Clark Fork River, with its confluence near Garrison, MT approximately 27 stream miles downstream of the proposed restoration project area. The project area is located entirely within Sections 7 and 18 of Township 9N, Range 6W. A project site map is shown in **Figure 1** of this report.

The project will enhance fish and aquatic life, riparian, wildlife and water quality resources in at least 2.6 miles of the upper Little Blackfoot River. The project will "replace" injured fisheries and wildlife resources in the Clark Fork drainage through enhancement of upper Little Blackfoot River fish populations and through increased recruitment of fish to downstream portions of the Little Blackfoot River. The project may also "replace" injured populations of native fish species by increasing available habitat for westslope cutthroat trout and bull trout, both of which are present in limited numbers in the upper Little Blackfoot River. The project has the potential to enhance fisheries, water quality, fishing, and recreation for a considerable but unknown distance downstream of the project area.

The Little Blackfoot River falls within the defined natural resource damage areas of the Upper Clark Fork River Basin. The project will not interfere with the ongoing settlement between the State of Montana and ARCO over natural resource damages.

11. Actual Restoration of Injured Resources

The Upper Little Blackfoot River Restoration Project will "replace" injured fisheries, riparian, wildlife, and water quality resources in the upper Clark Fork Basin equivalent to those that were injured. The project will: 1) increase the available habitat for native and non-native salmonid fish, 2) increase fish populations, 3) increase production of fish food organisms, 4) restore riparian vegetation and riparian wildlife habitat, 5) stabilize stream banks and reduce erosion, and 6) improve water quality in the Little Blackfoot River. The project may also "replace" injured populations of native fish species by increasing available habitat for westslope cutthroat trout and bull trout, both of which are present in limited numbers in the upper Little Blackfoot River. It will also enhance fish passage to upstream and downstream reaches of the river and increase recruitment of fish to downstream portions of the Little Blackfoot River. Lastly, the proposed project will also complement the planned restoration of a 2.5-mile section of the lower Little Blackfoot River.

Other causes and sources of impairment are present within the Little Blackfoot River that contribute to the river's fisheries problems. These include streamflow depletion/dewatering and elevated water temperatures, which affect the sections of the river below the project area. The success of this project is not expected to be constrained by streamflow or water temperature limitations. Water quality problems associated with historical mining activities are present in the river well upstream from the project area. The Helena National Forest has been systematically reclaiming these abandoned mine sites with resulting improvements to water quality.

12. Relationship Between Service Loss and Service Restoration

The impaired fish populations, riparian health, and water quality in the upper Little Blackfoot River has reduced recreational opportunities, fishing, and aesthetics. The Upper Little Blackfoot River Restoration Project will reduce excessive non-point source pollution, improve fish and riparian wildlife habitat, increase fish populations, and improve water quality in the upper Little Blackfoot River. The project will "replace" injured resources through the creation and enhancement of fish, riparian, and water quality resources equivalent to those that were injured.

This restoration project is aimed at replacing the fish, vegetation, and wildlife resources that were injured, as well as lost recreational services.

13. Public Support

The Deer Lodge Valley Conservation District's board of supervisors is highly supportive of this project because it is consistent with District's goals, objectives, and priorities, and because the project is located within a high priority watershed. The Little Blackfoot Watershed Group, consisting of Little Blackfoot Valley landowners, agency representatives, and citizen groups, was involved in the original 2001 assessment of the Little Blackfoot River and the development of the restoration plan for the project area. They have wholeheartedly endorsed this application for project implementation funds.

The Upper Clark Fork River Basin Steering Committee and the Tri-State Water Quality Council endorsed the Upper Clark Fork Basin restoration project development grant that funded development of the restoration plan and have expressed their support for project implementation. The Montana Water Trust has been working with landowners in the Little Blackfoot watershed to explore voluntary opportunities for resolving streamflow depletion problems. They have also expressed their strong support for this restoration project.

Montana Fish, Wildlife and Parks has voiced support for this restoration effort, has contributed in-kind donations of time for development of the restoration design, and facilitated private sponsor contributions towards the project from Northwestern Energy Corporation.

Staff of the Natural Resources Conservation Service offices in Deer Lodge have lent support and consultation to this project since its inception, and will be a prospective partner in implementing the project through the anticipated provision of EQIP program matching grant funding.

Lastly, staff of the Helena National Forest participated in the development of the restoration plan and have encouraged its implementation in conjunction with their efforts to reclaim abandoned mine sites in the Little Blackfoot headwaters area.

Letters of support for this project are included in **Appendix C** of this application. The appendix also includes a letter from the property landowner registering their consent and support for the project.

14. Matching Funds and Cost Sharing

Anticipated project cooperators include the State of Montana Natural Resource Damage Program, NRCS, MFWP, Deer Lodge Valley Conservation District, the Little Blackfoot Watershed Group, the landowners, the project contractor(s), and the Pat Barnes Chapter of Trout Unlimited. All of the prospective sponsors have been involved in the development of this or other restoration projects in the Little Blackfoot watershed. **Table 9** below is a preliminary breakdown of total project costs and cost shares.

Table 9. ***Preliminary funding plan for the Upper Little Blackfoot River Restoration Project.***

Prospective Sponsor	Total Contribution	% of Project	Funding Type
NRDP	$238,878.80	76.1	Restoration Grant
NRCS	$43,464,26	13.9	EQIP Program Grant
MFWP	$20,000	6.4	Future Fisheries Grant
Noxious Weed Trust	$1,000	0.3	Weed Grant
Landowner	$10,400	3.3	In-Kind - Materials
Totals	**$313,743.06**	**100**	

15. Public Access

The overall goal of the Upper Little Blackfoot River Restoration Project is to improve fisheries and riparian resources in the upper Little Blackfoot River through fish habitat enhancement, riparian revegetation, weed controls, reductions in stream bank erosion, and improved water quality. It is anticipated that this project will accomplish these goals at the project site as well as in upstream and downstream reaches of the Little Blackfoot River. As such, public benefits are expected to extend well beyond the immediate project area.

The project area is entirely private land, though the river consists of state waters. Anglers and other recreationists have access to the river up to its normal high water mark under the Montana Stream Access Law. Fishermen are also routinely granted access to the subject property by permission of the landowners. These circumstances are not anticipated to change following project implementation, even though access requests may increase over time, as the benefits of the project becomes known.

The project area landowner and the ranch manager have been involved in the restoration project planning and are excited about seeing this project through to completion. They are aware of and sensitive to the issue of maintaining public recreational access to publicly restored project areas.

16. Ecosystem Considerations

The Little Blackfoot River is one of the largest tributaries in the Upper Clark Fork Basin. Water uses and fisheries in the Little Blackfoot drainage are impaired due to a variety of problems. In 2001, the Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group teamed up to complete a comprehensive assessment of the Little Blackfoot River from the Helena National Forest boundary to its confluence with the Clark Fork River. The purpose of the assessment was to provide a basis for a watershed-scale restoration plan. The 32-mile length of the river was divided into 27 sections for purposes of cataloging assessment information. Impairments within each reach were evaluated in detail and a relative ranking of the condition of each reach and the feasibility and cost effectiveness of restoration was established. This information was then used to set restoration priorities within the Little Blackfoot River corridor. The proposed Upper Little Blackfoot River Restoration Project was ranked as the second highest priority for restoration based on this analysis. The highest priority segment of the river, the Little Blackfoot River from the Beck Hill Road to the Clark Fork River, is being addressed under a separate project proposal.

Upper Little Blackfoot River Restoration Project addresses multiple resources, including fisheries, water quality, riparian vegetation and associated wildlife. The project will help to address fisheries habitat fragmentation issues by restoring the river corridor in a 2.6-mile impaired segment of the river located between two relatively high quality sections of the river. This is demonstrated in **Tables 1** and **2** of this report.

17. Coordination and Integration

The Little Blackfoot Watershed Group meets on a periodic basis and includes representation from many landowners, agencies, citizen groups, and non-profit organizations. The watershed group has served as a forum for discussing a variety of projects and issues within the greater Little Blackfoot watershed. The Upper Clark Fork River Basin Steering Committee has also provided a coordination role for activities within the upper Clark Fork basin, including the Little Blackfoot River. The Tri-State Water Quality Council is coordinating a host of non-point source pollution control efforts in sub-watersheds throughout the greater Clark Fork basin. Each of these groups is familiar with this project, and with the broader efforts of the Little Blackfoot Watershed Group to systematically improve the condition of the Little Blackfoot River.

Three specific coordination needs are anticipated at this time. The first relates to Montana DEQ's planned development by 2012 of water quality restoration plans and total maximum daily loads (TMDLs) to address water quality impairment issues in the Little Blackfoot watershed. DEQ will need to incorporate the past watershed assessment and restoration planning information into the TMDL planning process. Secondly, the Helena National Forest's continuing efforts to address abandoned mine problems in the upper Little Blackfoot watershed should be coordinated and integrated with the Little Blackfoot Watershed Group's basin-wide restoration planning efforts. Lastly, the Montana Water Trust's efforts to seek solutions to stream dewatering problems addresses a critical limiting factor in downstream reaches of the Little Blackfoot River that should be coordinated with efforts to improve aquatic habitat and water quality.

We recommend that the Deer Lodge Valley Conservation District and the Little Blackfoot Watershed Group facilitate coordination between all of the aforementioned groups relative to integration of respective restoration activities in the Little Blackfoot watershed. These groups will be invited to participate in regular meetings of the conservation district and watershed group, and invitations will also be extended to be placed on a mailing list for periodic progress reports on the Upper Little Blackfoot River Restoration Project.

18. Normal Governmental Functions

Restoration planning associated with this project has been largely completed under a separate work effort. This project proposal involves implementation of the resulting restoration. Evaluation of the potential for duplication of normal government functions focuses on implementation aspects of the project.

Montana DEQ's water quality restoration planning process and TMDL program described in the previous section will set broad water quality restoration goals for the Little Blackfoot River and determine the required pollutant reductions that are necessary for attaining and maintaining water quality standards in the river. They will also establish pollutant allocations by geographical location within the watershed, and provide general recommendations for curbing pollutant loading by land use activity. They may or may not provide site-specific implementation strategies for restoring water quality, and they do not provide the funding to do so. TMDLs address water quality impairments associated with specific pollutants (such as sediment, nutrients, and metals), but they are not required for impairments caused by habitat degradation or stream dewatering. The latter problems must be resolved on a strictly voluntary basis. As such, the Upper Little Blackfoot River Restoration Project is likely to further the goals of DEQ's water quality planning and restoration program, but it is improbable that it would ever duplicate or assume responsibility for a project of this type.

Some aspects of the proposed effectiveness monitoring program for this project may overlap to a degree with normal government functions. These include fish population estimates and spawning surveys by Montana Fish, Wildlife and Parks, and water quality monitoring activities performed by Montana DEQ. However, most monitoring requirements for the Upper Little Blackfoot River Restoration Project are beyond the agencies' normal scope of work for a single watershed, and consequently are not a part of normal agency functions. To avoid any possible duplication of effort, Deer Lodge Valley Conservation District and its contractors will work closely with NRDP staff to coordinate monitoring activities and to take full advantage of existing or planned agency monitoring efforts on the Little Blackfoot River.

Stage 2 Land Acquisition Criteria

Not Applicable

Stage 2 Monitoring and Research Criteria

Not Applicable

Step 6. Proposal Budget

Budget Narrative

Applicant Name: Deer Lodge Valley Conservation District

Project Title: Upper Little Blackfoot River Restoration Project

The Upper Little Blackfoot River Restoration Project spending plan will follow the project implementation plan and timetable described in **Sections C** and **D** of this application. All tasks except contract administration will be completed using contracted services. Deer Lodge Valley Conservation District intends to contract directly with Land & Water Consulting/PBS&J for all

sub-contracted aspects of the project. Land & Water Consulting/PBS&J has been involved with the District's work in the Little Blackfoot watershed since 2000, has contributed many hundreds of hours of donated time to these efforts, and has been pre-qualified by the State of Montana Department of Administration to provide stream restoration, revegetation, and monitoring services to governmental entities and other public procurement units, including conservation districts. The District's intention to contract with Land & Water/PBS&J is continent on the firm retaining its pre-qualified status at the time of contracting (2007 or beyond). The proposed arrangement will also allow private entities to benefit from the implementation of the Upper Little Blackfoot River Restoration Project.

The budget for the Upper Little Blackfoot River Restoration Project was developed using 2006 Department of Administration contract rates. The estimated costs are listed in the table following this budget narrative section. It should be noted that inflationary cost increases were not incorporated into the project budget estimates at this time. This should be considered at the time of contract negotiations if this project is funded because this project will extend over a five-year period. Contingency costs for construction services have been included in the present budget estimate.

Funding sources for the Upper Little Blackfoot River Restoration Project are listed in the proposed funding source table. Meetings with NRCS staff and the landowner indicate a good likelihood for EQIP program matching project funding beginning in 2007. NRCS staff helped develop the project budget as well as the EQIP match projections. MFWP Future Fisheries grant funds will be pursued in 2006 as an additional source of matching funds. If future fisheries grant applications are unsuccessful, the Deer Lodge Valley Conservation District is prepared to pursue other qualifying sources of project cash match to replace this prospective funding source. A Montana Noxious Weed Trust Grant has been applied for as a final source of cash match towards this project. Lastly, we have included $10,400 in landowner in-kind match for live plants to be used for revegetation efforts and raw materials (log vanes and root wads) for fish habitat enhancement and stream bank erosion control. The proposed cash and in-kind match sources will equal about 24 percent of the projected total project cost of $313,743.

Appendix A

PHOTOGRAPHS

Upper Little Blackfoot River Restoration Project

PROPOSED UPPER LITTLE BLACKFOOT STREAM RESTORATION PROJECT AREA
AUGUST 2001 PHOTOGRAPHS

Photo 1: Taken just downstream of the confluence with Telegraph Creek.

Photo 2: Increasing width/depth ratio and declining vegetative condition.

Photo 3: Raw banks and sediment deposits.

Photo 4: Terrace near Mike Renig Gulch.

Photo 5: Unstable banks near Mike Renig Gulch.

Photo 6: Reach 6B – Stable section with rock and woody vegetation upstream Highway 12.

Appendix B

FIGURES 2 THROUGH 12

Upper Little Blackfoot River Restoration Project

Appendix C

Letters of Support

Upper Little Blackfoot River Restoration Project